



AGRICULTURAL RESEARCH INSTITUTE

PUSA

NATAL
DEPARTMENT OF AGRICULTURE.
VOLUME XIII.
JULY—DECEMBER, 1909.
THE NATAL
Agricultural Journal.

Published for and Edited in the Department of Agriculture.



Publishers :
THE "TIMES" PRINTING AND PUBLISHING COMPANY, LIMITED,

1909

INDEX.

VOLUME XIII.

		PAGE		PAGE
A				
	Abattoir Charges. <i>In each issue.</i>			
	Agricultural Analysis, Fees for. <i>In each issue.</i>			
	Agricultural and Rural Associations :			
	First International Congress,			
	1910 	45		
	Agricultural Associations. Annual			
	Reports—			
	Alfred 	682		
	Camperdown 	683		
	Dundee 	675		
	Malton 	530		
	New Hanover 	535		
	Upper Biggarsberg 	537		
	Weenen 	524		
	Agricultural Chemistry for Beginners.			
	By Archibald Pearce, 262, 549, 690, 800			
	Agricultural Union, Inter-Colonial ...	294		
	Agricultural Union, Inter-Colonial :			
	Fifth Annual Conference. Report			
	of Proceedings 	331, 478		
	Agriculture and Forestry, Division of:			
	Monthly Report. <i>In each issue.</i>			
	Alcohol for Industrious Purposes :			
	Some Notes on its Uses. By			
	J. F. E. Barnes, C.M.G., Chief			
	Engineer, Public Works Depart-			
	ment 	26		
	Alcohol from Bananas ...	720		
	Alcohol (Industrial) and Fibre from			
	Leaves and Stems of Plants. By			
	Thomas Barraclough ...	65		
	Alfred County Farmers' Association :			
	Annual Meeting 	682		
	Animals from India and Mauritius,			
	Importation of 	7		
	Apiculture : Notes for Beginners. By			
	W. C. Mitchell, Government			
	Apiarist 	60		
	Apple Orchard : Tillage <i>versus</i> Sod			
	Mulch in the Apple Orchard ...	187		
	Argentine International Exhibition,			
	1910 	484		
B				
	Bacon Curing, Co-operative. By			
	Loudon M. Douglas ...	307		
	Bags (Grain), Weight of ...	163		
	Baling Press, A New ...	588		
	Bananas, Alcohol from ...	720		
	Bananas in England, Prices of ...	292		
	Barley, Manuring of ...	117		
	Bees : Hints from the Hive ...	773		
	Bee-Keeping, A South African Book			
	on 	448		
	Bee-Keepers' Association, Natal :			
	Monthly Notes and Comments.			
	By W. C. Mitchell, Government			
	Apiarist, Central Experiment			
	Farm, Cedara. <i>In each issue.</i>			
	Bees : Transferring. By "Apis Mel-			
	lifera" 	503		
	Bee, The Living. By Mary Ritchie,			
	President, Natal Bee-Keepers'			
	Association, Natal Expert South			
	African Bee-Keepers' Association			
		604, 723		
	Beef, Export of Chilled : Successful			
	Australian Treatment ...	763		
	Biliary Fever, Trypan Blue for ...	672		
	Bills for Parliament, New ...	452		
	Books, Reviews of :			
	A Farmers' Handbook ("The			
	South African Farmers'			
	Guide and Handbook") .	410		
	Agricultural Education ("A			
	Rural Reader for South			
	Africa") 	412		

	PAGE
Books, Reviews of (<i>continued</i>):	
Fruit Preserving ("Successful Jam Making and Fruit Bottling")	521
Dairy Work ("Successful Dairy Work")	522
Estate Management ("Small Estate Management")	523
Bone Meal, Steamed	670
Boric Acid, Transferring, from Cattle Food to Cow's Milk	520
Breeding and Pedigree Records	118
Breeding, In-	517

C

Cabbages, Manuring	517
Calcium Cyanamide	298
Calving Time	117
Camperdown Agricultural Society: Annual Meeting	682
Camperdown Show	129
Cane. <i>See under</i> "Sugar Cane"	
Capons	425
Caravonica Cotton	587
Cattle Feeding Experiment	519
Cattle Washer, Quibell's Patent	591
Cheese Making, Effects of Glass, Metals, &c., in	671
Chemistry for Beginners, Agricultural. By Archibell Pearce	262
	549, 690, 800
Chicks, Newly Hatched	268
Churn, A Novel	714
Cigar Boxes, Enquiry for	586
Citrus Fruits, Rates on	8
Colony's Need, The	439
Contributors—	

Acutt, Leonard, J.P., — "The John Deere Co. Steam Plough," 169.

"Anglo-Indian" — "Tea in Natal," 174.

Barnes, J. F. E., C.M.G. — "Alcohol for Industrial Purposes: Some Notes on its Uses," 26

Barnes, J. F. E., C.M.G. — "The International Road Congress, Paris, 1908," 593

Barracrough, Thos. — "Industrial Alcohol and Fibre from Leaves, and Stems of Plants," 65

Beattie, W. R. — "Earth Nuts and their Culture," 355, 493.

Beattie, W. R. — "Onion Culture," 188, 327.

Contributors—(*Continued*).

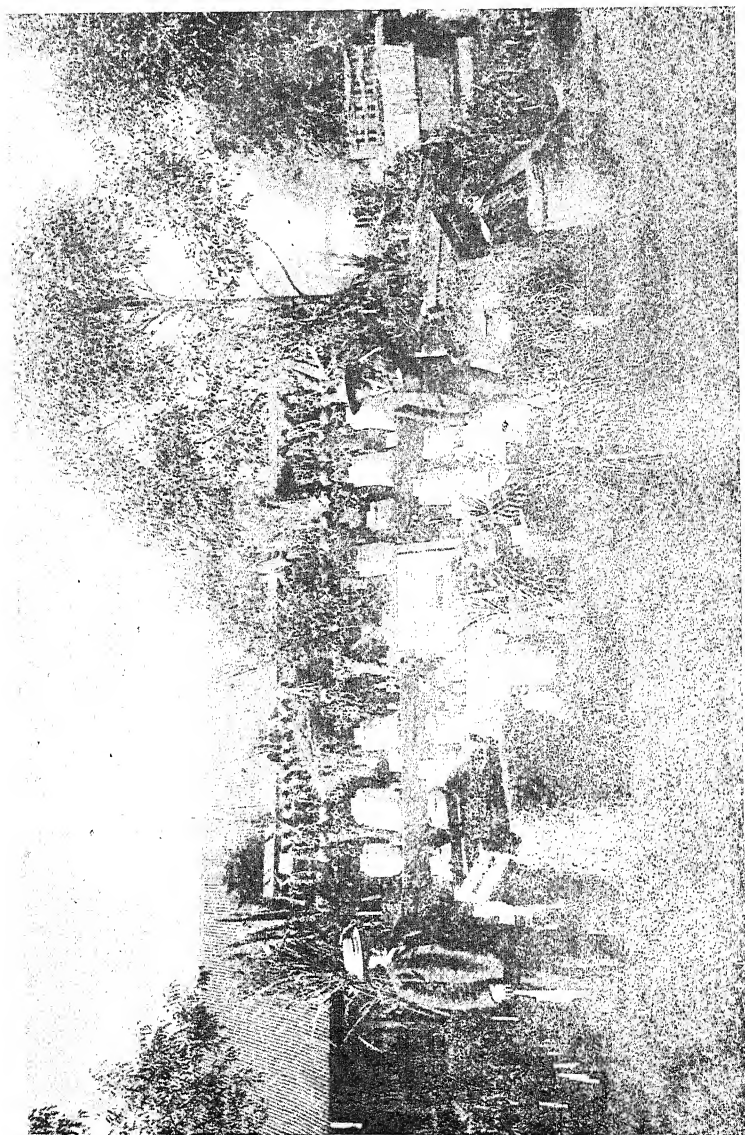
Carter, Geo., F.R.H.S. — "Farm and Garden Notes" — <i>In each issue.</i>	
Chilvers, C. W. — "The Seasoning and Characters of Natal Native Timber," 475.	
Choles, H. J. — "Farming Implements and Machinery," 731.	
Choles, H. J., F.S.S. — "Natal's Progress in 1908," 555, 615.	
Douglas, Loudon M. — "Bacon-Curing, Co-operative," 307.	
Douglas, Loudon M. — "Swine Husbandry and Bacon Production," 611.	
Douglas, Loudon M. — "The Meat Industry and Agriculture," 318.	
Du Toit, P. J. — "Agricultural Statistics," 312.	
Hendriksen, H. C. (and M. J. Lorns.) — "Pineapple Cultivation," 39.	
Jones, W. E. — "The Wattle Processionary Caterpillar," 745.	
Kanthack, F. E., A.M.I.C.E. — "Immigration, Past, Present and Future," 17.	
Kemp, W. G. — "Mechanically Propelled Vehicles as Feeders to the N.G.R.," 32.	
Lorns, M. J. (and H. C. Hendricksen). — "Pineapple Cultivation," 29.	
McMillan, E. J., B.S.A. — "Winter Feed for Stock," 209.	
Mitchell, W. C. — "Apiculture: Notes for Beginners," 60.	
Montgomery, J. W. V. — "Kafir Labour or Our 'Boys,'" 741.	
Payne, Prof. H., M. Inst., C.E., M.I.M.E. — "Some Aids to Irrigation," 301.	
Pearce, Archibald. — "Agricultural Chemistry for Beginners," 262, 549, 690, 800.	
Pitchford, Lt.-Col. H. Watkins, P.V.S. — "Breeding for Remount and Saddle Purposes," 465.	
Power, W. M. — "Epizootic Lymphangitis," 539.	
Ritchie, Mary. — "The Living Bee," 604, 723.	

	PAGE		PAGE
(Correspondence—		East Coast Fever, Cape Border Ports of Entry	453
Alcohol, Denatured.—J. E. E.		East Coast Fever, Cape and	450
Barnes	414	East Coast Fever 14, 285, 297, 630,	783
Ants, White, About.—Howard		East Coast Fever, Monthly List of Outbreaks. <i>In each Issue.</i>	
Mullens	497	East Coast Fever, The Bloemfontein Conference	646
Barberry Tallow.—Honeywill & Taylor	541	Egg Production	78
Bow Yokes.—“Learner”	685	Epizootic Lymphangitis	295
Calf Complaints.—T. J. Alex- ander	794	Epizootic Lymphangitis. By W. M. Power, Chief Veterinary Division	539
Cotton.—M. Boulanger	794	Equines, Introduction of, into Natal	8
Firebreaks.—R. Leigh	256	Exchange Reviews. What Others are Thinking and Doing. <i>In each Issue.</i>	
Hodder Patent Water Elevator	792	Experiments, Home, Value of	219
Laboratory Dip.—H. D. Dinkel- man	792		
Maize Export.—“Ploughman”	685	F	
Ophthalmia in Cattle.—Chas. W. Holmes	792	Farm and Garden Notes. By Geo. Carter, F.R.H.S. <i>In each Issue.</i>	
Potato Sorter.—E. E. Downing	256	Farmer and Scientific Research, the	707
Prickly Pear Pest, The.—William Cooper & Nephews	793	“Farmer Boys’ Pages.” <i>In August and succeeding Issues.</i>	
South African Woods for Rai- way Coaches.—Geo. Bowden	686	Farmers, Among the. The Associa- tions during the Month. <i>In each Issue</i>	
Wensleydale Sheep.—Arthur Dixon	256	Farmers’ Associations Executives of	142, 566
Cotton, Caravonica	587	Feed, Winter, for Stock. By E. J. McMillan, B.S.A., Assistant Dir- ector of Agriculture, O.R.C.	209
Cotton Crop, Artificial Manures and the	124	Fibre (Industrial Alcohol) from Leaves and Stems of Plants. By Thomas Bañraclough	65
Cotton Culture	12	Forest, Hlatikulu	8
Cow, Milking the	516	Fowls, Grit for	553
Cows, Diseases of the Udder in	123	Fowlsickness, a Preventative for	36
Cows, Separated Milk for	671	Fruit Drying	167
		Fruit Fly Control	216
D		Fruit from Cape Colony, Importation of	162
Dairy Cows, Feeding	293	Fruit Trees, Manuring of	240
Departmental Notices. <i>In each Issue.</i>			
Dip, Laboratory	446	G	
Diseases, Notifiable	9	Grain Bags, Weights of	163
Dundee Agricultural Society, Annual Meeting	675	Grain for Export, Handling. Bulk <i>versus</i> Sacks	196
Durban and Coast Agricultural Society, Ninth Annual Show	105	Green Crops	118
		Grit for Fowls	553
E		Gypsum as a Manure	24
Earthnuts and their Culture. By W. R. Beattie, Assistant Horticul- turist, U. S. Bureau of Plant Industry	355, 493		
East Coast Fever, Advisory Com- mittees	570		
East Coast Fever, Cape and Natal, Story of the Negotiations; An Important Telegram	377		

	PAGE		PAGE
H		M	
Hail Prevention	587	Machinery, Farm, Articles on ...	288, 452
Hailstorm Insurance	164	Machinery, Farming Implements and :	
Helianti	584	What the Natal Farmer has to	
Hlatikulu Forest	8	choose from. By H. J. Choles...	731
Hodder Water Elevator, the ...	716	Machinery : Potato Sorter, A New ...	11
Horse-Breeding, Influence of Soil in	517	Machines, Stone Gathering ...	787
Horse, Muscles of the	268	Maize, A New Disease of ...	291
Horses for Remount and Saddle Pur-		Maize Brochure, S.A. ...	453
poses, Breeding of. By Lt.-Col.		Maize Competition, O.R.C. ...	167
Watkins-Pitchford, P.V.O. and		Maize Congestion, The ...	157
Staff Officer, Remounts, Natal		Maize, Consumption of : What Natal	
Militia	465	Farmers require annually ...	491
Horsesickness	715, 721	Maize Drying... ..	590
Horses, Saddle and Harness ...	243	Maize Export... ..	290, 445
Horse Stalls, False Floors in ...	203	Maize Export Regulations ...	7
		Maize Export : Shipments to date .	650
I		Maize Export : Some Interesting	
Implement Demonstration, Farm ...	717	Figures	498
Implements and Machinery, Farming :		Maize, Final Estimate	1
What the Natal Farmer has to		Maize Husking Peg : A Useful Idea	238
choose from. By H. J. Choles...	731	Maize Husks, Enquiry for ...	447
Implements of the Farm, 259, 417,		Maize Meal : English Appreciation...	296
344, 687, 797		Maize Prospects	578
In-Breeding	517	Maize Stalks, Sugar from ...	241
Incubation	423	Malton Farmers' Association : Annual	
Insects, etc., Transmission of Dis-		Meeting	530
eases by : A request for col-		Manganese and Pineapples ...	124
lections	759	Manure, Gypsum as a	241
Insurance, Hailstorm	164	Manuring Cabbages	517
Insurance, Livestock	159	Manuring for Milk	123
Irrigation and Cultivation ...	514	Manuring Fruit Trees	240
Irrigation, Past, Present and Future.		Manuring with Superphosphate, and	
By F. E. Kanthack, A.M.I.C.E.,		the presence of Lime in the Soil	670
Director of Irrigation, C.C. ...	17	Mealie Grub and Totofanas ...	588
Irrigation, Some Aids to. By Prof.		Mealies. See " <i>Maize</i> ." ...	
Harry Payne, M. Inst., C.E.,		Meat Industry and Agriculture, The.	
M.I.M.E.... ..	301	By Loudon M. Douglas ...	318
		Mechanically Propelled Vehicles as	
K		Feeders to the N.G.R. By W.	
Kafir Corn, Grading	155	G. Kemp.	32
Kafir Corn, Railway Rate on ...	9	Meteorological Returns. <i>In each Issue.</i>	
		Milk-Giving Sheep	586
L		Milk, Manuring for	123
Labour or Our "Boys," Kafir. By		Milk Sickness... ..	126
J. W. V. Montgomery	741	Milk Supply, The. Lecture by Prof.	
Land and Agricultural Loan Fund ...	141	Loudon M. Douglas... ..	202
Lemon Oil, Manufacturing	9	Moles, Destruction of	204, 590
Lime in Cultivation, Use of ...	267	Mules from Argentina	164
Live Stock Insurance	159	Mushroom Culture	449
Lucerne, etc., for Horses	673	Mutton, Prices of	586
Lucerne, Disc-Harrowing	245		
Lucerne Tylenchus : An Apparently			
Serious Stem Sickness of Lucerne	751		
Lungsickness in Lower Umzimkulu			
Division	10		

	PAGE		PAGE
N		S	
Natal's Progress in 1908. By H. J. Choles, F.S.S. ...	555, 615	Renard Road Train, The ...	368
Natal Sugar Association...	587	Reviews, Exchange: What Others are Thinking and Doing ...	784
New Hanover Agricultural Association: Annual Meeting ...	535	Road Congress, The International, Paris, 1908. By J. F. E. Barnes, C.M.G., Chief Engineer, P.W.D., Natal ...	593
Notes and Comments. <i>In each Issue.</i>		Rubbing Post, A Patent ...	293
O		S	
Oil, Lemon, Manufacturing ...	9	Scale, Remedy for ...	716
Onion Culture. By W. R. Beattie, Assistant Horticulturalist, U.S. Bureau of Plant Industry 188,	327	Science and the Farmer Notes of Interest by Farming Experts. <i>In each Issue.</i>	
Orchard Culture: Tillage <i>versus</i> Sod Mulch in the Apple Orchard ...	181	Scour, White ...	127
Ostrich Farming ...	153, 290	Sheep, Milk-Giving ...	586
Ostrich Farming: Natal's Possibilities. Lecture by Mr. R. W. Thornton	221	Sheep Notes ...	269, 422, 552
P		Sheep, Oats for ...	786
Papaya Juice ...	289	Shows, Agricultural and Other ...	138
"Phalaris commutata" ...	4, 114	Silage, Stack ..	765
Phosphates at Tweedie ...	10	Soil Air ...	515
Pigs, Breeds of, Favourite ...	785	Soil, a Chat about the ...	264, 419, 549, 695, 803
Pig-Feeding Experiments ...	785	Soil in Horse-breeding, Influence of ...	517
Pig Notes ...	552	Soil Moisture, Conservation of ...	125
Pigs: Supplements to Maize for Fattening Hogs ...	245	Soils, Composition of the Air or Cultivated ...	519
Pineapple Cultivation. By H. C. Hendricksen and M. J. Lorns, Horticulturalists, Porto Rico Agricultural Experiment Station	39	Soils, Weathering of ...	553
Pineapples, Manganese and ...	124	South African Book on Bee-Keeping	448
Plantain, The ...	117	Sow, Points of a Good ...	808
Plough, The John Deere Co. Steam. By Leonard Acutt, J.P. ...	169	"Starters" and their Use. ("Farmer Boys' Pages") ...	269
Potatoes Entering O.R.C., Examination of ...	585	Statistics, Agricultural. By P. J. du Toit ...	312
Potatoes for the Transvaal: New Regulations ...	207	Statistics, Agricultural, Transvaal ...	292
Potatoes, Irrigating ...	516	Stock, Winter Feed for. By E. J. McMillan, B.S.A., Assistant Director of Agriculture, O.R.C. ...	209
Potatoes, Sprouting ...	615	Sugar Association, Natal ...	587
Potatoes, The "Greening" of: Some Kew Experiments ...	322	Sugar Cane, Cultivation of Ratoon Cane ...	324
Potato Sorter, A New ...	11	Sugar Cane, Effect of Soluble Salts on Growth of ...	518
Poultry Foods, The Study of: Their Composition and Relative Values	55	Sugar Cane, Manuring of. Effects of Soluble Manures in Cane-Soils ...	756
Poultry Run, "Wasters" in the ...	424	Sugar Cane, Moisture Requirements of. The Amount needed for Maximum Development ...	218
Poultry Yard, Better than a Pound Notices. <i>In each Issue.</i>	201	Sugar Cane, Wax from ...	784
R		Sugar Crop, European ...	291
Ramie ...	158	Sugar Estates, Watering ...	589
Rates, N.G.R., Revision of Local Goods ...	8	Sugar from Maize Stalks ...	221
		Sugar Interests ...	718
		Sugar Planters, Data for. Some Useful Notes and Figures ...	112

	PAGE		PAGE
Sugar, Revised Duties on ...	6	U.	
Swine Husbandry and Bacon Production. By Loudon M. Douglas, Lecturer on the Meat Industry, College of Agriculture, Edinburgh ...	611	Upper Biggarsberg, Residents' Annual Report ...	527
T		V	
Tanning Industry, Wattle Bark and the ...	165	Veterinary Congress, International	161
Tea in Natal. By "Anglo-Indian"	174	W	
Telephones, Farm ...	451	Water, Duty and Measurement of ...	118
Telephones for South Africa, Farm. Some Interesting Correspondence	372	Water Elevator, Hodder's, A New Invention ...	648
Tick-Bird, the ...	716	Water for Live Stock ...	424
Timber, etc., in O.R.C., Introduction of ...	719	Wattle Bark and the Tanning Industry ...	165
Timber, Natal Native, the Seasoning and Characters of. By C. W. Chilvers ...	475	Wattle Processionary Caterpillar, The. By W. E. Jones ...	745
Tin, a New Patent ...	162	Wax from Sugar Cane ...	784
"Traffics and Discoveries" ...	97, 381	Weeds, Destruction of, by Insects ...	788
Train, Renard Road ...	368	Weenen Agricultural Society, Annual Show ...	128
Toowoomba Canary Grass. The So-Called "Phalaris commutata" ...	4, 114	Weenen Agricultural Society, Annual Meeting ...	524
Transferring. By "Apis Mellifera"	503	White Scour ...	127
Transport, Farm. The Renard Road Train ...	378	Wood and Grass, Introduction of, into O.R.C. ...	13
Transport, Introduction of, into Cape Colony ...	10	Wool Sales, Cedara, Students at ...	582
Trees, The Value of ...	807	Wood; Waste, and its Utilisation. Some Notes on Wood Distillation. What might be done with our Wattle Wood ...	49
Trypan Blue ...	449, 672	Z	
		Zululand Farms, Freehold Tenure for	289



THE GOVERNMENT EXPERIMENT STATIONS' EXHIBIT AT THE
ROYAL AGRICULTURAL SHOW, MARITZBURG.

The Natal Agricultural Journal.

The Final Maize Estimate.

WE have now reached the end of the season for maize. The crop has been harvested, and quite an appreciable portion of it has already been exported. We are accordingly now in a position to publish a final estimate of the crop, based upon data received from our correspondents all over the country. During the past six months we have published, as a "sub-leader," a monthly revision of our first estimate of the probable crop according to conditions prevailing at the end of December; and we think that the final estimate which we are about to give reflects the position as fairly as can be expected under present circumstances. It is our ambition to make our estimates more and more reliable each year, and consequently with each season we hope to introduce fresh improvements into our methods of collection of data and calculation therefrom as well as to enlarge the circle of our correspondents. In this connection we may mention that we shall be glad to hear at any time from gentlemen who would be prepared to help us next season, to whom we shall be pleased to send particulars as to what the filling in of the forms for us really involves. We would also here take the opportunity of thanking all who have so very kindly helped us during the season which has just closed, for their ready assistance in filling in and posting us the schedules supplied to them—which service has been done regularly without any break by practically every correspondent.

Last month we had to report a diminution of the crop by about 20,000 muids, bringing our estimate down to 750,000 muids. We are pleased to be able to state now that the crop picked up well in May, so that we can now add 50,000 muids to our last revision, bringing it up to 800,000 muids. The condition of the crop at the end of June was 2-82

(that is to say, not far from an average crop), representing a probable yield of 4.86 muids to the acre. The probable yield at the end of May, it may be remembered, was 4.54 muids to the acre, based upon a general condition of 2.64.

In order that the progress or otherwise made by the crop each month may be properly appreciated, we give below two statements, one showing the condition of the crop each month in each of the Magisterial Divisions of the Colony, and the other showing the average condition of the crop, the yield per acre that condition represents, and the total crop promised thereby, at the end of each of the months, December—June. As usual, the figures 1, 2, 3 and 4 are used to represent the conditions "Poor," "Fair," "Average," and "Above the Average," intermediate figures (decimals) representing intermediate states.

The first statement shows the progress or otherwise the crop has made in each of the Magisterial Divisions of the Colony:—

CONDITION OF CROP.

(Note.—A condition "above the average" is represented by the figure 4; "average" by the figure 3; "fair" by the figure 2; and "poor" by the figure 1; intermediate figures represent corresponding conditions.)

Division.	Condition of Crop at End of:—						
	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
Lower Umzimkulu ...	2.7	3.0	2.7	2.5	2.5	2.0	2.0
Alexandra ...	2.5	4.0	4.0	3.0	3.0	2.0	3.0
Umlazi ...	3.0	3.0	3.0	2.5	2.0	2.5	2.0
Inanda & Indwedwe ...	3.0	4.0	3.0	2.0	3.0	3.0	2.0
Lr. Tugela & Mapumulo	2.0	4.0	3.0	2.0	3.0	2.0	2.0
Impendhle ...	3.0	3.0	3.0	3.0	3.0	2.0	4.0
Alfred ...	3.0	4.0	3.4	4.0	3.0	4.0	4.0
Ixopo ...	2.4	4.25	3.5	3.0	2.75	3.0	3.4
Richmond ...	2.5	3.0	3.0	2.5	2.0	3.0	3.0
Umgeni ...	3.0	3.5	4.0	3.2	3.4	3.5	3.4
New Hanover ...	2.0	2.75	2.4	3.0	3.0	3.4	3.0
Lion's River ...	3.0	3.0	2.5	3.0	3.0	2.5	3.0
Umvoti ...	3.7	3.2	3.2	3.5	3.4	3.0	3.4
Krantzkop ...	3.0	2.0	4.0	3.0	3.0	3.0	3.0
Underberg ...	4.0	3.0	2.4	2.5	3.0	3.0	3.0
Potela ...	3.0	4.0	4.0	4.0	4.0	4.0	4.0
Bergville ...	3.0	2.7	2.0	2.4	2.4	2.4	2.4
Estcourt ...	2.7	2.9	2.5	2.0	2.7	2.4	2.7
Weenen ...	3.0	2.0	2.0	2.0	2.0	2.0	3.0
Klip River ...	2.8	2.6	2.75	2.4	2.0	1.7	2.0
Umsinga ...	2.0	2.5	3.0	2.5	2.0	3.0	2.5
Dundee ...	2.0	1.7	2.0	2.0	2.0	2.0	2.0
Newcastle ...	3.0	2.9	2.8	2.3	2.3	1.5	2.0
Vryheid & Ngotshe ...	2.5	2.0	3.0	1.0	1.0	1.0	2.0
Utrecht ...	—	4.0	3.0	2.0	3.0	2.0	2.0
Babanango ...	—	—	—	2.0	1.0	2.0	2.0
Eshowe & Mtunzini ...	3.0	2.5	3.0	4.0	2.0	2.5	3.0
Emtonjaneni ...	2.0	3.4	3.4	3.0	3.0	2.0	4.0

The second statement shows the average condition of the crop (for the whole Colony), the yield per acre promised and total crop:—

			Condition.	Yield per acre.	Probable total crop.
At End of—				Muids.	Muids.
December	...	2.7	4.7	780,000	
January	...	3.1	5.34	886,000	
February	...	3.0	5.16	856,000	
March	...	2.69	4.63	770,000	
April	...	2.7	4.65	770,000	
May	...	2.64	4.54	750,000	
June	...	2.82	4.86	800,000	

In our May issue we referred to the question of the surplus available for export from this season's crop. To arrive at anything like a tolerably accurate idea of the exportable surplus we must know (*a*) the probable extent of the Natives' and Indians' crops, and (*b*) the farm consumption of the Europeans' crop. In connection with the former of these two considerations we may repeat what we said in May on the subject:—

"Whilst we have not been able to institute any really systematic inquiries as regards the extent of the Natives' crops this year," we remarked, "it is admitted on all sides—and the reports that we have received confirm the opinion—that the crop will be larger than usual this year. Whilst many reports state that the Natives will be able to sell to a considerable extent this year, we prefer to be conservative and reckon on the fact that the Natives will at the least be able to support themselves this year. We have made careful calculations, and we think we can safely say that the Natives' and Indians' crops (the latter, of course, is a comparatively small crop) together will amount to about 900,000 muids."

This practical certainty that, on the whole, the Natives will be able to support themselves this year enables us to consider the European crop without any further reference to the Natives' requirements. The European crop, we have estimated, is probably something like 800,000 muids in extent this season. The consumption of the European crop in the Colony will probably be something like 400,000 muids. We shall thus have an exportable surplus of about 400,000 muids this year—that is to say, for consumption not only to oversea ports but to other parts of South Africa as well.

Before we close we would like to refer to the losses which are occurring this year through grain being sent down to the port in a damp condition. Considerable quantities have been rejected by the Government Grader as unfit for export, and as a result there have been heavy losses owing to there not being sufficient facilities for the drying of the grain. To endeavour to place the blame would be idle; those who are to

blame have suffered sufficiently to require no injunction to "Be careful in future"; but the least that can be said is that it is most regrettable that so much absolute waste should have occurred simply through what appears to have been downright carelessness. What other result but rejection by the Government Grader could be expected in sending down damp mealies to the port we cannot think, but whatever chances may have been taken by those responsible, there has been no doubt about the disillusionment. We sympathise with those who have suffered, but it is to be hoped that this year's experience will not be repeated.

"Phalaris Commutata."

OPINIONS as to the value of the new winter grass, so-called "*Phalaris commutata*," vary, and vary widely. While one section of those who have tried the grass are enthusiastic regarding it, another section are disgusted at the results they have had. Mysterious though this difference of opinion appears on the face of it, its explanation is simple, as we hope to show in the course of the present article.

There is not the slightest doubt that there are farmers who have had fine results from their trial of this grass; whilst on the other hand it is equally true that a number of farmers have had disappointing results. Reduced to plain terms, whilst the former find the grass a perennial as claimed for it, the latter dispute its claim to be a perennial, as they find they have to plant afresh each year.

We had a chat on the subject recently with Mr. Geo. Carter, of the well-known firm of Messrs. Carter & Co., who have been doing a great deal in the direction of introducing this grass into the Colony; and he explained to us that the reason of the difference of opinion to which we have referred is that, whilst those farmers who obtained, directly or indirectly, Australian seed have found the grass everything that is claimed for it, others, who purchased *Phalaris commutata* seed from Europe, have found that this European seed does not produce a perennial plant but only an annual. While Mr. Carter was with us we turned up an article on "Toowoomba Canary Grass: the so-called '*Phalaris commutata*,'" which appeared in the December, 1908, issue of the *Journal* of the Victorian Department of Agriculture, and there we found an explanation of the matter, which makes the whole thing clear so far as the practical farmer

is concerned. It appears that seeds of about 60 different grasses were received over twenty years ago by the Curator of the Botanic Gardens, Toowoomba, Queensland, from the United States Department of Agriculture. All the other varieties were lost except one, which persisted in out-of-the-way places, such as hedgerows, etc., until four or five years ago it was noticed again and its propagation systematically undertaken. It was at first identified as *Phalaris commutata*—in fact, this was the name of the seed imported 20 years ago. The real *Phalaris commutata*, however, is an annual, while this Australian-acclimatised grass was found to be a perennial. Elsewhere in this issue we reproduce in full the article in question from the *Journal* of the Victorian Department of Agriculture, which apparently gives all that is known on the subject of the strange change which has come over the European *P. commutata* under Australian conditions. It will be seen that the real specific name of the perennial grass is not known with certainty, but it is agreed that it is not strictly speaking *commutata*, and accordingly we shall no longer be justified in speaking of the grass as "*Phalaris commutata*." Perhaps if we adopt the Australian popular name—"Toowoomba Canary Grass"—we shall be on the safe side and avoid confusion; or we should not be wrong in speaking of it as "*Phalaris*" pure and simple, although the other name is perhaps better.

Obviously, it is our duty to warn farmers against buying *Phalaris commutata* seed from Europe, and we would further advise them to make quite sure, when buying so-called "*Phalaris commutata*" seed from South African dealers, that the seed has been imported from Australia (or obtained from locally grown *Phalaris* of the proper perennial variety) and not from Europe or America. Furthermore, those who may wish to import from Australia for themselves are advised to ask for "Toowoomba Canary Grass—perennial '*Phalaris commutata*.'"

The following have been recently appointed stock inspectors: Mr. L. T. Trenor, Mr. John Swales, Mr. A. J. Tanner (assistant for Klip River Division), Mr. J. M. de Lange (assistant for Utrecht Division), Mr. H. B. Chandler (temporarily, for Zululand), Mr. C. Watson (assistant for Newcastle Division), and Mr. C. J. van Rooyen (assistant for Umvoti and Krantzkop Divisions). Mr. S. H. Halahan has been appointed an Inspector of Sheep or Sheep Dipping Officer at Union Bridge, *vice* Mr. B. R. Howes, under Law No. 48, 1887.



Monthly Notes on Bee-Keeping.

THOSE of our readers who are interested in bee-keeping will doubtless be glad to learn that the *Natal Agricultural Journal* has, together with the *South African Poultry Journal*, been chosen by the Natal Bee-Keepers' Association as the official organ of the Association, as a result of which they will be kept up to date concerning the doings of the Association as well as regards most matters of interest to bee-keepers generally. In the present issue of the *Journal* will be found the first instalment of monthly notes, by Mr. W. Mitchell, the Apiculturist at Cedara; and we would also draw the attention of beginners in apiculture to the interesting and useful article on the subject which Mr. Mitchell has also contributed. There is a large market in South Africa for honey, and it is to be hoped that the Natal Bee-Keepers' Association will meet with the success it deserves in its efforts to stimulate practical interest in apiculture in this country. We hope to be in a position to publish shortly a series of practical articles on apiculture, by an acknowledged authority on the subject. Negotiations to this end are now in progress.

Revised Duties on Sugar.

The following regulation has been made by His Excellency the Governor in Council, under the provisions of Section 20 of Act No. 9, 1906, in substitution for Government Notice No. 215, 1909, and in addition to the Regulations provided for by Government Notice No. 314, 1907:—A special duty has been fixed provisionally for the following countries at the undermentioned rates: Brazil, per 100 lbs.: raw sugar, 12s. 11d.; refined sugars, 12s. 6d. Mexico, per 100 lbs.: raw sugar, 1s. 1d.; refined sugars, 1s. 1d. Spain, per 100 lbs.: raw sugar, 7s. 11d.; refined sugars, 7s. 11d. Costa Rica: white sugars, 7s. 4d. per 100 lbs.; refined, 5s. 4d. per 100 lbs.; unrefined, 5s. 5½d. per 100 lbs. The Regulations of Government Notice No. 314, 1907, so far as it relates to the provisional duty on sugar from Spain is, therefore, amended as above.

Land and Agricultural Loan Fund.

The attention of those desirous of borrowing from the Fund is called to the fact that the office fees payable on application have been reduced to a uniform sum of 10s., irrespective of the amount applied for. Formerly the fees ranged from £1 to £4, according to the sum which the applicant desired to borrow. We understand that so far about 150 applications for loans have been accepted, totalling approximately £85,000.

Importation of Animals from India and Mauritius.

In view of the fact that the disease, "surra," exists in Mauritius and is endemic in certain parts of India, it has been deemed expedient to prohibit the importation of all animals from those countries, and accordingly a Proclamation (No. 53, 1909), has been issued embodying this prohibition. The Proclamation, which is made under the provisions of Law No. 13 of 1886 and the Animals Diseases Act of 1894, fixes the penalty for contravention of this prohibition at a fine for every animal imported not exceeding £50 with the alternative of imprisonment, with or without hard labour, until the payment of such fine, such imprisonment not to exceed the term of three months.

Maize Export Regulations.

The following addition to Section XVII. of the Port and Harbour Regulations has been approved by His Excellency the Governor in Council:—Rule 272a.—No goods intended for export should be off-loaded within Harbour jurisdiction until the Wharf authorities have been furnished with full written particulars thereof, and are satisfied that the storage accommodation required is reasonable, and that the loading steamer named in the said writing is the first available steamer for shipment. The applicant for this accommodation shall in every case be the party held liable by the Department for any rent that may accrue. Failing the goods being shipped in accordance with the said written advice or of other subsequent advice satisfactory to the Department, rent will be charged in terms of Rule 270. In cases where the parties concerned fail, neglect, or refuse to satisfy the Wharf authorities regarding the storage accommodation required, rent will be charged in terms of Rule 270. Rule 272b.—Maize deposited in the Wharf sheds found to be wet or weevily must be at once removed by the owner or his agent. Failing a prompt removal being effected, it will be competent for the Wharf authorities to take the required action at the risk and expense of the goods. Rule 272c.—The Official Grader will not issue a grade certificate for any consignment of maize until it is actually being shipped, but he will, if requested at any time prior to the shipment, examine and verbally advise on any consignment.

Rates on Citrus Fruits.

We have been advised by the General Manager of Railways that, with effect from July 1st, 1909, the rates appearing in Clause 60, page 38 of Goods Tariff Book No. 22 for fruit exported overseas beyond South Africa will only apply to fruit consigned through the Government Grader. Fruit not so consigned will be charged at the S.A.P. "B" rate.

Introduction of Equines into Natal.

In connection with Proclamations Nos. 28, 1908, and 36, 1909, prohibiting the introduction of equines from the Transvaal, Orange River Colony and Cape Colony into Natal except by written permission of the Principal Veterinary Surgeon of Natal (which was only to be given subject to the animals having been submitted to the Mallein test), a further Proclamation (No. 50, 1909), has now been issued ordering that the Mallein test prescribed must in every case be conducted by a qualified veterinary surgeon approved by the Natal Principal Veterinary Surgeon.

Hlatikulu Forest.

In terms of Regulation No. 2 (a) made under Ordinance No. 4 of 1853, and published under Proclamation No. 58, 1903, the undermentioned Crown Forest, known as the Hlatikulu Forest, having been surveyed, has been declared to be a demarcated forest within the meaning of the Regulations. Plan of this forest is now lying in the office of the Director of the Division of Agriculture and Forestry. The forest is bounded north-westwards by the Drakensberg Location No. 1, northwards by "Forest Lodge No. 2," eastwards by "Forest Lodge," and southwards by "Mazwe."

Revision of Local Goods Rates, N.G.R.

The General Manager of Railways announces that, with effect from the 1st August, 1909, the following articles will be re-classified in local bookings between N.G.R. stations, viz.:—Cases in tubes, from "normal" to "inter. B"; bottles and jars, common glass, at owner's risk, from "inter. B" to "rough"; tin, in sheets, to be used in manufacturing tinware, from "inter." to "rough"; cardboard, millboard, and strawboard, from "inter." to "rough"; angle, channel, T, bar, and rod iron, from "inter." to "inter. B"; seeds (imported) for agricultural purposes, from "normal" and "inter." to "rough"; iron (galvanised), in 10-ton lots (undamageable), from "inter. B" to "rough"; gutters and guttering (undamageable), from "normal" to "inter."; S.A. barley, beans, bran, buckwheat, chaff, fodder, forage, grain, e.o.h.p., hay, Kafir corn, lucerne, maize, millet, oats, oathay, onions, potatoes (including sweet potatoes), seeds, straw, sugar cane for cattle feeding (small lots), vegetables (fresh or dried), from S.A.P. "B" to S.A.P. "C."

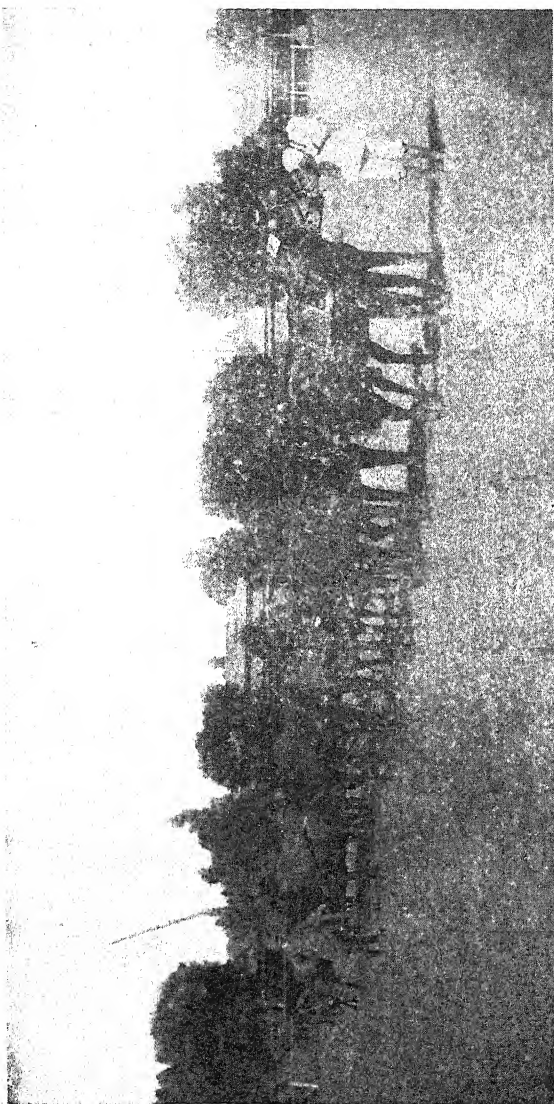


Photo. by/

[J. J. Stephenson,

TRANSPORT EXHIBITS AT THE "ROYAL" SHOW.—I.

Complete Transport Turnout—Natal Transport Department's Entry.

Railway Rate on Kafir Corn.

Readers will doubtless be interested to hear that South African Kafir corn for export overseas beyond South Africa is now being conveyed on the Natal Government Railways at the same rates and under the same conditions as South African maize so exported, both in local and through traffic.

Notifiable Diseases.

The Chief of the Veterinary Division of the Department of Agriculture has published a reminder that the diseases Redwater and Gall-sickness are contagious or infectious diseases within the meaning of Act No. 38, 1904, and that all deaths from these diseases should be reported to the District Veterinary Officer or Stock Inspector of the Division. Under Section 4 of the Act, any person who has in possession or charge any animal showing symptoms of these diseases is supposed to isolate the animal immediately and at once give notice to the owners or occupiers of adjoining properties and to the Magistrate of the Division.

Manufacturing Lemon Oil.

In a recent report the United States Consul at Messina refers to the lemon oil manufacturing industry of Sicily, and gives some interesting particulars of the method in vogue there in the manufacture of the oil. In order to prepare the essential oil, he states, the peels are first soaked in water for some four or five minutes for the purpose of softening the envelopes of the oil vesicles, and rendering easier the expression of the oil. The peels are then carried to the expressing room, which is usually darkened, and kept as cool as possible, to guard against any changes in the character of the delicate and unstable oil. In the expressing room each workman is seated on a low stool, and has before him a glazed earthenware bowl, across which, and resting in depressions in the rim, is a wooden rod run through a good-sized sponge. In his left hand the workman holds another sponge, often cup-shaped, against which he presses the outside of the peel, giving this a circular twisting motion. By this means the walls of the oil cells are broken, and the oil is squeezed out into the sponge to drip into the bowl. In this the oil rises to the top of the water, and can be decanted off. The oil is filtered into large copper containers, in which it is stored to await sale. Various machines have been tried for expressing the oil but so far without success. The amount of oil obtained will vary largely according to the district and the season, but will average from 0.7 lb. per 1,000 lemon peels to 1 lb., and, in rare cases, to as much as 1½ lb.

Lungsickness in Lower Umzimkulu Division.

Lungsickness having broken out in the Lower Umzimkulu Division, the farm "Perbeck" in that Division has been proclaimed an infected area under the Lungsickness Prevention Act of 1897, thereby rendering unlawful the removal of any cattle from that area, whether the same are or are not infected with lungsickness. Any person contravening this Proclamation is liable in respect of every such offence to a fine not exceeding £20 sterling, or, in default of payment, to imprisonment, with or without hard labour, for a period not exceeding three months.

Phosphates at Tweedie.

On the 20th instant an interesting announcement appeared in the *Natal Witness* to the effect that a promising discovery of phosphates had been made on Mr. F. W. Player's farm, "Valkalla," near Tweedie Station, and it was stated that some of the "float" stone recently taken from this property had proved to contain as much as fifty per cent. of pure phosphate. Samples of the newly-discovered stone have been declared by the Commissioner of Mines, after rough tests, to contain phosphate of fairly high grade; and Mr. Gray considers that, if the mineral occurs in quantity, it is worthy of further attention. Since the examination of these samples Mr. Player put in a cross-cut, six feet in depth, and has struck a rich "leader" about a foot wide, dipping at an angle of 45 degrees. Mr. Player's farm lies immediately north-east of the railway at Tweedie Station, and is bounded on its upper side by the Umgeni Heights; it is bisected by the road between Howick Village and Tweedie Station. Mr. Player is to be congratulated upon what appears to be a valuable discovery, and we trust his efforts to exploit his "find" will prove a success.

Introduction of Transport into Cape Colony.

A Proclamation has been issued by the Cape Government notifying that, from and after the 25th May, 1909, the introduction of transport wagons and other vehicles and goods through the Ports of Entry at Ingeli Gate and Middledrift will be permitted only on production of a certificate signed by the District Resident Magistrate of Harding or Port Shepstone, as the case may be, in the form set forth in the schedule below, to the effect that they were hauled by horses, mules or donkeys when leaving Harding or Port Shepstone, which certificate must be completed by the owner or person in charge as provided therein before such vehicles or goods can be admitted through any of the Ports of Entry in question.

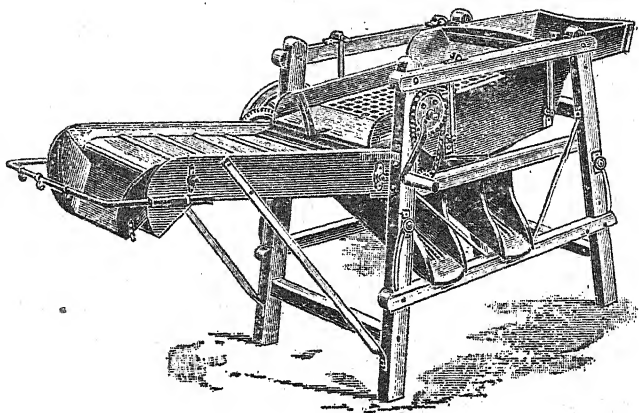
The form of the schedule referred to is as follows:—"I hereby certify that the vehicles and goods in charge of of who is proceeding with them from Harding to Ingeli Gate, (*or Port Shepstone to Middledrift*), for the purpose of crossing the Cape Border, were drawn by (*here insert number of animals and whether horses, mules or donkeys*) when leaving this village. (*to be signed by Resident Magistrate*). Place ; date I hereby solemnly and sincerely declare that the vehicles and goods above described have been drawn all the way to the border from Harding (*or Port Shepstone*) by, and that no horned cattle have been yoked to the vehicles. And I make this solemn declaration consciously believing the same to be true (*to be signed by Owner or Person in Charge*). Declared before me this day of, 19 (*to be signed by a Justice of the Peace*) (*signature of Officer in Charge at Port of Entry*)

A New Potato Sorter.

A machine of very considerable utility, and one which should appeal to those interested in the question of the export of potatoes to England as well as to other parts of South Africa, is an improved form of potato sorter, fitted with a new sorting platform, which is now being placed on the market by Messrs. Coock & Son, of Commercial Street, Northampton. This sorter—which is described in a recent number of the *Ironmongers' Chronicle*—is the result of several years' experience, and is confidently recommended as a thoroughly efficient and durable machine at a very moderate price. It is simple, strong, easy to work (as a boy can turn it), and is readily moved from place to place, especially if fitted with the new drop handles. It separates the potatoes into three sizes at the rate of from 30 cwt. to two tons per hour, and effectually removes the soil. The tubers are delivered into 1 cwt. bags, and these are arranged so that the machine can be worked continuously, one bag being removed while another is being filled. The seeds and chaffs are delivered at the side, the soil falling underneath, but customers desiring delivery on the opposite side, or one on each side, can have machines made to their order.

The sorter can also be adapted for onions, bulbs, chemicals, and many similar purposes. A novel and useful feature is the sorting platform introduced last season, which has given very great satisfaction and will be found invaluable to growers having a quantity of blights or diseased potatoes, or those wishing to make a specially good sample. It consists of a canvas with laths attached, which travels slowly and conveys the potatoes along, thus enabling all blights or badly shaped potatoes

to be readily seen and removed. It is attached to the separator by four bolts only, so that it can be very quickly fixed, and is driven by gearing direct from the crank spindle. It delivers the potatoes into bags and can be worked continuously. We reproduce herewith, from the *Ironmongers' Chronicle*, an illustration of the sorter which gives a good idea of its general appearance.



Cotton Culture.

The following interesting letter, sent to the Editor of the *Natal Mercury* by Mr. Chas. Hill, a Zululand settler, contains much that is encouraging to those who are losing hope as regards the possibilities of Natal and Zululand as a cotton-growing country. Mr. Hill's suggestion that the Natives be instructed in cotton-culture and be induced to take it up, selling the unginned cotton for cash to storekeepers and others, is interesting and worthy of consideration. In parts of West Africa the Natives grow cotton satisfactorily, and it is quite possible the same thing might prove feasible here. Mr. Hill's letter is as follows:—"Sir,—No need exists for pessimism as regards cotton culture. I have proved that Zululand grows cotton free of ball-rot, and it can be raised with no extra work than that required for mealies. The picking is the only tedious work. Trees planted here fifteen years back are bearing cotton, although quite uncultivated. Last year, despite the fact that my land was badly prepared, insufficiently fertilised, and denuded of labour by the last comic opera military demonstration, from 11 acres I pulled 2,312 lbs. of cotton (the seed was planted two months late), and sent 1,500 lbs. to Mr. Kirkman, who kindly ginned it and sent it Home. It must not be taken as failure that the returns were not satisfactory; it was my ignorance, but experience will remedy that. A man to grow cotton requires capital, and in Zululand we have lost our oxen that broke the land. Cotton land wants good preparation,

and the oxen supplied economical traction. Mules and donkeys are expensive, and subject to disease. As I have repeatedly written, our leasehold tenure ties our hands, and we cannot receive any financial assistance, as our leases are of no value. The Transvaal cotton planters can get all the capital they require, while I cannot get sufficient to buy a team of donkeys. Mr. Kirkman knows the possibilities of Zululand as a cotton country. The Natives have lost the whole of their cattle, and I proposed the handing of small parcels of seed to them, with a view of raising crops, and for the storekeepers to buy at, say, 1½d. per lb. for bolls. There should be a gin in a central position locally or in Durban. The missionaries I have spoken to consider the proposition feasible, as the women and children will do the work, but as the bags of cotton are delivered they want to see a cash return. If settlers could place their unginned cotton as easily as they do mealies, we would grow respectable quantities, but for small men to find gins, packs, freights, and then await a return from England of, say, three months, puts cotton out of the question for any but strong financial men. Let capital be made available, and Zululand will provide sufficient cotton to be a respectable asset to the country. To expect individual effort in Natal to do what any other country considers a national undertaking is not feasible."

Introduction of Wood and Grass into O.R.C.

It being considered expedient to amend the Orange River Colony Proclamations (Nos. 13 of 1909, and 48 of 1908) dealing with the introduction of firewood, brushwood, timber, grass and grass hay from the Colony of Natal to the Orange River Colony across the Natal Border, the O.R.C. Government has issued a new Proclamation (No. 41 of 1909) on the subject, the provisions of which are as follows: From and after the promulgation of this Proclamation, the introduction of any of the articles hereinafter mentioned into this Colony from the Colony of Natal shall be subject to the following prohibitions and provisions:—(1) The introduction of the following articles is absolutely prohibited, *viz.*: (a) Mealie stalks, leaves and cob husks; (b) Kafir corn stalks, leaves and heads; (c) Sugar cane or any parts thereof; (d) Brushwood; (e) Grass or grass hay or any articles packed in grass. (2) The introduction of any timber or wood, including firewood, is absolutely prohibited, except as hereinafter provided, *viz.*: (a) Newly manufactured timber, new or second-hand vehicles and bambec whipsicks may be introduced without restriction; (b) Barked wattle poles (including those intended for firewood) or other barked poles and second-hand manufactured timber which has been used in the construction of any building or article may be introduced if accompanied by a certificate in the form set forth in Schedule A signed by a Justice of the Peace or Stock Inspector of the Colony of

Natal or a member of the Natal Border Guard of this Colony and bearing date not more than seven days previous to that of the said introduction. (3) Lucerne or lucerne hay or any other forage crop, though containing an admixture of grass or grass hay may be introduced if it appears to the satisfaction of the Customs Officer member of the O.R.C. Police or of the Natal Border Guard at the place of entry that the said lucerne or forage crop was grown in enclosed lands on which no cattle have been depastured and that grass has been cut together with the lucerne or other forage crop.

Any person introducing or attempting to introduce, whether as principal agent or servant by himself or another, any article into this Colony in contravention of any of the above provisions, shall be liable to a penalty not exceeding fifty pounds, or, in default of payment, to imprisonment with or without hard labour for a period not exceeding six months. Proclamations No. 13 of 1909, and No. 48 of 1908, are repealed. The following is the form of the schedule referred to above: "I hereby certify that the undermentioned articles have been disinfected by being dipped in or thoroughly sprayed with a solution made by dissolving one pound of arsenite of soda in twenty gallons of water. Description of timber or vehicles Date Signed (Justice of the Peace or Stock Inspector of the Colony of Natal or Member of Natal Border Guard of O.R.C.) Address."

East Coast Fever Regulations.

In terms of Section 3 of Act No. 34, 1906, the Minister of Agriculture has ordered (Government Notice No. 342) that, from and after the 1st July, 1909, no movement of cattle shall be allowed from the Province of Zululand. Any person disobeying this Order is liable to a fine not exceeding £100, or to imprisonment, with or without hard labour, and with or without the option of a fine, for any period not exceeding six months. All orders heretofore issued, in so far as they are in conflict with this order, are by this Notice superseded. The Minister has also ordered (Government Notice No. 352) that, from and after the 15th July, no movement of cattle shall be allowed into, within, or from the Magisterial Divisions of Vryheid, Ngotshe, and Paulpietersburg. Notwithstanding this prohibition, however, healthy cattle intended for immediate slaughter may be moved into, from, or within any of the Divisions in question, on permit granted by the Chief, Veterinary Division, or by an officer appointed by him to issue such permits, and in special cases where it appears to him desirable the Chief, Veterinary Division, or an officer appointed by him, is authorised

to issue permits for the removal of other cattle into, from, or within any of the said Divisions, subject to such conditions as he may see fit to impose; removal to be made within the time and according to the directions contained in the permit, and not otherwise. In terms of Act No. 32, 1903, any person disobeying this Order is liable to a fine not exceeding £100, or to imprisonment, with or without hard labour, and with or without the option of a fine, for any period not exceeding six months. All orders heretofore issued, in so far as they are in conflict with this Order, are superseded by this Notice.

By virtue of the powers conferred on him under the East Coast Fever Act No. 32, 1903, and all amending Acts, the Minister of Agriculture has ordered (Government Notice No. 356) that, from and after the 15th July, the removal of hides, horns, hoofs, hair and heads of cattle, cut grass, manure, litter from places where cattle are kept, and lucerne or other fodder, from, into, or within the Magisterial Divisions of Vryheid, Ngotshe, and Paulpietersburg is prohibited except on permit granted by the Chief, Veterinary Division, or by an Officer of the Veterinary Department authorised by him to issue such permits. Any person disobeying this Order is liable to a fine not exceeding £100, or to imprisonment, with or without hard labour, and with or without the option of a fine, for any period not exceeding six months.

With reference to Government Notices Nos. 505, 1909, and 735, 1909, whereby I prohibited the removal of lucerne or any other fodder from, into, or within any infected area except upon permit obtained from the Advisory Committee or Committees concerned, the Minister of Agriculture has ordered (Government Notice No. 343) that, from and after the 1st July, 1909, the removal of lucerne or any other fodder from, into, or within the Magisterial Divisions of Alfred, Alexandra, Bergville, Camperdown, Durban, Dundee, Estcourt, Inanda, Ixopo, Impendhle, Ipolela, Krantzkop, Klip River, Lion's River, Lower Umzimkulu, Lower Tugela, Mapumulo, Newcastle, New Hanover, City of Pietermaritzburg, Richmond, Umgeni, Umvoti, Umlazi, Umsinga, Utrecht, and Weenen, is prohibited, except on permit granted by the Chief, Veterinary Division, or by an officer of the Veterinary Department authorised by him to issue such permits. All permits issued by Advisory Committees, District Committees, or Permit Officers appointed by such Committees, for the removal of lucerne or any other fodder into, from, or within any of the said Divisions shall, from the 1st July, 1909, be cancelled and become null and void. A fine not exceeding £100, or imprisonment, with or without hard labour, and with or without the option of a fine, for any period not exceeding six months, is the penalty for contravention of this Order.

The Order contained in Government Notice No. 671, 1908, prohibiting the acquisition of cattle by any person, whether by sale, barter, gift, or otherwise, except under the conditions of a permit issued by the Minister of Agriculture, has now been made applicable to the Magistral Divisions of Vryheid, Paulpietersburg, Ngotshe, Inanda, Lower Tugela, and Mapumulo (Government Notice No. 383). By Government Notice No. 355, the Minister of Agriculture has ordered that, from and after the 15th July, 1909, all permits issued by Advisory Committees, District Committees, or Permit Officers appointed by such Committees, for the removal of cattle, hides, hoofs, horns, hair, and heads of cattle, cut grass, manure, litter from places where cattle are kept, and lucerne or other fodder, into, from, or within the Magisterial Divisions of Vryheid, Ngotshe, and Paulpietersburg, shall be cancelled and become null and void. A Government Notice (No. 326) has been issued cancelling Government Notice No. 240, 1909, whereby a zone was declared on the commonage of Greytown.

Do not teach the colts bad habits. What seems cute to-day may be vicious in a few months.

RATE FOR CITRUS FRUIT EXPORT OVERSEA.—The General Manager of Railways announces that, with effect from July 1st, 1909, the rates appearing in Clause 60, page 38, of Goods Tariff Book No. 22, for fruit exported oversea beyond South Africa will only apply to fruit consigned through the Government Grader. Fruit not so consigned will be charged at the S.A.P. "B" rate.

The following addition to paragraph 1 of Clause 33 of the N.G.R. Goods Tariff Book No. 22 has been approved by His Excellency the Governor in Council:—"The above regulations also apply to trucks containing grain for export oversea beyond South Africa, instructions for disposal of which are not received within 24 hours of their arrival at Point, notwithstanding that the Railway Department may under their contract be required to undertake the off-loading."

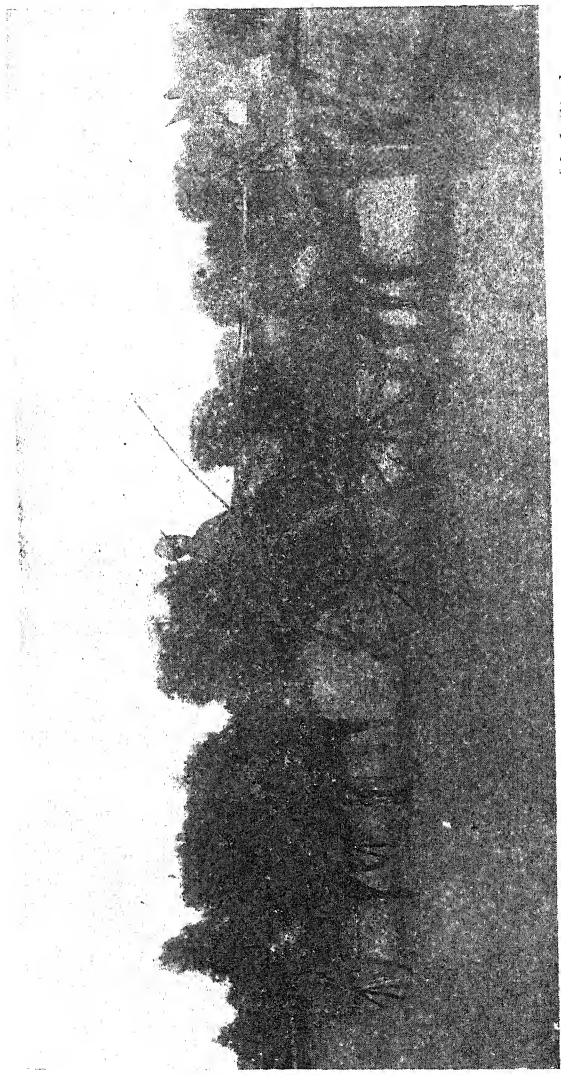


Photo. by /

TRANSPORT EXHIBITS AT THE "ROYAL" SHOW.—II.

Natal Transport Department's Conveyances.

/ J. J. Stephenson.

Irrigation: Past, Present and Future.

By F. E. KANTHACK, A.M.I.C.E., *Director of Irrigation, C.C.*

(Continued from Page 722, Vol. XII.)

LANDS, GOOD AND BAD.

SOME lands are naturally adapted for irrigation as regards subsoil drainage, surface slope, mechanical and chemical condition of the soil. Other lands are deficient in some respects, but are capable of being made fit for irrigation by means of suitable treatment, such as subsoil drainage of terracing, etc. There is a limit, however, to the amount of correction which can thus be applied, and this is determined by financial considerations. Even when we come down to the area of land in the river valleys and vleis, and the Karroo soils of sufficient depth to warrant being brought into a scheme, on careful investigation we find much picking and choosing necessary. Surface conditions are misleading. We must examine the subsoil if irrigation is contemplated, and here we find pot-clay, lime banks, gravel beds, close to the surface, alkali deposit, and what not. Taking a typical area in the western Karroo valley, for which a careful soil survey was made for a proposed irrigation scheme, the good soil amounted to less than 50 per cent. of the area considered irrigable. Irrigation development must proceed strictly on business lines. No scheme should be undertaken which will not, after the most critical examination, promise a sufficiently good return to redeem all capital charges within a reasonable short period, and at the same time promise perpetual improvement of the land irrigated, or which cannot be shown clearly to be justified as a permanent insurance against losses in times of drought. A scheme which is neither profitable nor protective is not justified, and in considering, therefore, the area of land which may ultimately be brought under irrigation the business aspect must be considered equally with the physical aspects. Broadly speaking, I think we shall find that where suitable land exists, the area which can be placed under irrigation will be limited by the amount of water which we can bring to it. Taking the last census figures for what they are worth we might expect that about half a million acres are now under irrigation in the Colony. At a moderate estimate it should be possible to increase this area to three million acres at some future date, but very much more scientific methods of irrigation must first become the rule and not the exception.

PUSHING DEVELOPMENT.

Now, how are we to proceed to push development to the utmost extent and guide it carefully along sound lines? We must, in the first

place, know what our possibilities are, and by this I do not mean that we should confine our attention to large concentrated schemes. We must push on with our reconnaissance work till we know broadly, throughout the Colony, what amount of run-off we have got, how this may be increased, how and where it can be stored, localise all land suitable for irrigation, and investigate the best means and approximate cost of bringing the water in proper quantities to the land. This reconnaissance work brings to light possibilities for promising big schemes which require to be taken up as a whole. Other schemes are discovered which are capable of being developed gradually, that is started as a series of small individual schemes which at a later date, when considerable development has taken place, can be merged into a big project with possibilities of extension. Storage sites must be assiduously searched for and investigated, which may either benefit existing irrigation or form a source of supply for new irrigation. Finally, every effort must be made to discover the small local possibilities on each farm, be they in the nature of works for utilising flood water on lands or on the veld, storage works for irrigation and stock, or methods for the reclamation of the veld and prevention of sluits. This work has been started in this Colony, but the staff is minute, only one survey party of three young engineers being employed, and the country is vast. My endeavour is to take each of the big river systems in turn. For a work of this nature, I think with envy of the results obtained by the famous Reclamation Law of the United States of America, which provides that all moneys received from the sale and disposal of public lands in 16 Western States from the year 1901 (with the exception of five per cent. already reserved for education) shall be appropriated to a special reclamation fund, to be used for the examination, and survey for, and the construction and maintenance of irrigation works for the storage, division and development of waters for the reclamation of arid and semi-arid land. The survey work done by the Reclamation Service is monumental, and has been productive in the elaboration of a large number of notable irrigation projects now in course of construction. Where public lands come under irrigation, land is sold in lots not exceeding 160 acres. Settlers must pay off all cost of land and irrigation works in 10 instalments, and do not receive title till half the area has been reclaimed. We might have had something similar in the past, but I am afraid the time has gone by, very little Crown lands now remaining. Still even now such a fund would be useful for reconnaissance work, and detached surveys of big storage sites.

ADVICE TO FARMERS.

Coupled with this search for possibilities, there will be the present system of giving advice at nominal rates to farmers desirous of embarking on irrigation works, of granting loans for such works.

of any approved character on easy terms; and the Agricultural and Irrigation Departments must do all in their power to bring home to the farmers the advantages of irrigation and better agricultural methods, and demonstrate what these methods are and how they are to be applied. This policy is no mere pandering to what townsmen are apt to look upon as a backward, pampered class. It is vital to our future existence and prosperity that no labour and money should be spared to lift up this country's only true lasting industry from its present depths to a higher and higher level. At the same time the part played by the State in promoting development must not be allowed to run wild in doing all the things just enumerated. But it is undoubtedly the function of the State to carry out complete hydrographic survey operations, seek out storage or irrigation possibilities, advise farmers professionally, and help them with easy loans, make irrigation and agricultural experiments, demonstrate improved methods, and educate generally. It is also advisable to undertake the construction of large or difficult irrigation and storage schemes for the purpose of creating closer settlements. It is, however, essential that in a country such as this the State should keep clear of projects carried out and permanently administered by the State. The Indian Government, as owner of the vastest and grandest irrigation system the world has ever seen, is working under a set of conditions which could not possibly exist in a Colony such as this; and quite apart from the peculiar social and fiscal conditions of India, the great size of individual schemes makes State ownership and management imperative. Thus on the Cherab Canal, in the Punjab, over one million souls have been settled on what in 1890 was a desert, and this mass of humanity is dependent for its very existence of this great canal system. With us here, and the same applies to other Colonies and to the States, it is essential that the financial responsibility of the scheme shall rest with the people benefiting by it, that is to say, irrigation development must proceed by means of State-assisted co-operation on hard and fast business lines. The terms may be made very easy, as the increase in national wealth will rapidly repay the State for any temporary losses on interest or for the cost of administration, etc. The irrigating farmer must feel, however, that he is a shareholder in the scheme, and that, therefore, he must do his utmost to keep it to a high pitch of efficiency. It will have been noticed that the American Reclamation Law embodies the co-operative principle, and the terms of redemption in ten years would be considered very severe in this country. As a matter of fact, such terms would at present be prohibitive here. In only one direction is State enterprise and permanent control justified here, and that is in the planning, construction, and subsequent control and maintenance of storage works serving miscellaneous interests. Even in America under the Reclamation Law it is

provided that the title to, management and operation of, the reservoirs, and works necessary for their protection and operating shall remain in the Government.

INSURANCE AGAINST DROUGHT.

So much for the State's share in development. I will now briefly consider some influences which have an important bearing on the subject, and which are fundamental when considering the feasibility, or otherwise, of irrigation projects, large and small. With the exception of purely protective works—that is, schemes to insure a certain district against periodical severe drought or famine, where the proposition must be considered from an insurance and sentimental point of view—all *bona-fide* irrigation schemes must be clearly justifiable from a semi-commercial point of view. I say semi-commercial, as land development is often slow, and State-aided schemes may be undertaken which, from an ordinary commercial point of view, require many years to pay off arrears of interest and reach a productive stage. Irrigation schemes, generally small ones, in connection with stock farms, may be commercially justifiable entirely from an insurance point of view. Now, judged by these standards, whether a scheme is justifiable or not depends, firstly, on the capital cost of bringing water to the land and preparing the latter for irrigation; secondly, upon the capital value of the land in its unimproved aspect; thirdly, working costs, and, fourthly, market for the produce.

The first and second of these conditions are closely related, and the maximum commercial price for land with irrigation possibilities depends largely on the average cost of improvements. The cost of bringing land under irrigation in South Africa is very high indeed. Schemes costing £5 per acre are comparatively rare. £10 per acre, or thereabouts, is common and financially sound at present. Many irrigation schemes in this Colony have cost £20 and even £30 per acre. This does not, of course, include pure insurance works which may often cost upwards of £100 per acre and be thoroughly sound. The Ashton Canal, which commands 40,000 acres, of which for the present only 35,000 acres of the best are included in the project, is estimated to cost about £9 per acre. In the Transvaal a large number of the large projects have been worked up, and, taking the six proposed along the Vaal River, the capital cost per acre ranged from £12 15s. to £22. Now, let us compare these costs with those in other countries. In the Punjab, in Upper India, the five completed major canals have now an actual annual irrigable area of 4,923,000 acres, and the actual cost of construction has amounted to only £1 12s. per acre. As a considerable area is systematically followed, the annual irrigation is only about three-quarters of the total area irrigable, and the capital cost per irrigable acre is therefore even less than this. In the United Provinces

of Agra and Oudh the four major canals, with an annual irrigation of 3,390,000 acres, the average capital cost was, curiously enough, also £1 12s. per acre. In the United States, irrigating $5\frac{1}{2}$ million acres, costing 1.8, or again £1 12s. per acre. Taking 14 schemes being carried out under the Reclamation Act in 14 different States, the estimated capital cost is from £4 to £6 per acre, and amounts to £8 in one case. In Spain a canal through very rough country and presenting exceptional engineering difficulties is now approaching completion at the cost of £5 per acre. The figures quoted above show clearly that at present South Africa is at a great disadvantage as regards cost of construction. Within the past decade the great Punjab Canal Settlements have built up a gigantic wheat export trade, which has risen from small dimensions till the quantity supplied from Karachi has reached close on one million tons per annum. The grain is bagged and carried nearly a thousand miles by rail to the sea coast at commercial freight rates and is about the only wheat which is grown under perennial irrigation, and can yet profitably supply the great European market. The secret of Indian irrigation economics is cheap labour, and it is labour par excellence which constructs canals. Practically all materials of construction are in that country produced on the spot. Under such conditions one need not be too particular regarding the excellence of the land to be irrigated. But how different are things here. Very few of our bigger schemes are going to cost much less than £10 per acre, which fact, together with other adverse conditions greatly limits our scope for enterprise. Most troubles in South Africa arise from expensive, indifferent, and insufficient labour and irrigation and agricultural enterprise generally, which is almost wholly dependent upon labour, is one of the worst sufferers.

CAPITAL VALUE.

We now come to the second question—*viz.*, the capital value of unimproved land—and promptly meet renewed difficulties, as those values are in many cases so high as to preclude profitable development. In the earlier portion of this address I expressed myself grateful to the ostrich feather industry. In this connection it is proving mischievous. Land under lucerne has been run up to enormous prices, which require the highest class of ostrich farming with the present top prices in feathers to pay interest on capital, and this state of things is unsound and dangerous. But, far worse than this, unimproved lands, with reputed irrigation potentialities, is steadily rising in price, and has, in many cases, made the purchase of such land for development purposes very risky and foolish. The spirit of speculation has seized the landowners, and irrigation possibilities are now dealt in much the same manner as are highly-speculative syndicate shares on the Stock Exchanges of Johannesburg and Capetown. The man owning

the proposition draws up, with the help of his law agent, a wonderful advertisement which would do credit to a professional company-promoter. To develop his own land or invite sound co-operation is about the last thing which occurs to him. The majority of enterprising farmers who have gone in for irrigation have, firstly, to buy a farm with possibilities at a fancy price—far too high considering the subsequent cost of development, and the young, energetic farmer, full of zeal to develop a property, but with small capital, finds it impossible to get anything at a reasonable figure, or else starts his enterprise with a crushing mortgage bond, which is sooner or later the undoing of him. Before we can expect great development in irrigation it is essential that land shall be obtainable on much easier terms. Thirdly, we have working costs, and these must be reduced to the lowest figure compatible with efficient management. This is a matter where both irrigation and agricultural departments must come to the rescue. Irrigation is a science, but hardly so in this country, where it often consists in spilling water about. By experiment at selected Government stations, and by careful advice and demonstration, farmers must gradually be taught to improve their methods, so as to obtain the maximum efficiency—i.e., to get the greatest value in crop with the least labour and most economical use of water. I can assure you there is a vast amount to be learnt still in this direction. Bad irrigation is not only costly, but is disastrous to the land. Working costs include interest on capital, and if high grade crops are grown it is often feasible to instal a pumping plant at comparatively small cost, but with high working expenses, in preference to spending a large amount of capital on a gravitation scheme, with low working costs.

MARKETS.

Fourthly, markets have to be considered. Development has gone on fairly rapidly during the past few years, and where foodstuffs are grown under irrigation, the supply locally exceeds the demand. We are in many lines rapidly reaching the difficult period when production exceeds home consumption, but is for several reasons not marketable outside the country. The population of South Africa is very small, and the home market is restricted to the larger towns. In summer the climate is prejudicial to the carriage of perishables and distances are great and transport slow; hence we have still the anomaly of Capetown importing certain foodstuffs which are sold at great loss within the Colony. Irrigation is at present largely given over to ostrich farming, but it is obvious that the limit here is soon going to be reached, and the question of markets is intimately mixed up with irrigation development. Transport being one of the determining factors, irrigation should first be developed as much as possible in the most favourably situated parts of the country. This is especially necessary where closer settlement is aimed

at. Again, under present conditions, the sudden establishment of very large areas of concentrated irrigation, growing produce for which no overseas markets exist would be economically disastrous. In only one part of the Cape Colony can cereals be grown profitably under irrigation, *viz.*, along the Zak and Fish Rivers of the North-western Districts, where the very peculiar topographical, climate, and flood conditions make possible a system of basin irrigation somewhat resembling the old Nile system. Fifty to one hundred-fold yields of good wheat are assured in most years, with simple and inexpensive works, and with a minimum of labour, and I have calculated that with more careful control of the flood waters 300,000 to 400,000 bags of wheat could be produced here in an average year. Given a developing railway line from Carnarvon through this wheat-growing area to Calvinia, grain could be delivered at Hutchinson or De Aar at a considerably lower rate than imported or Western Province wheat.

THE STOCK FARMER.

Elsewhere our irrigation will be confined to lucerne, sweet grasses, roots and other crops required for stock-farming, potatoes and vines, orchards and vegetables. The stock-farmer, who will always be the mainstay of this country, has unrestricted scope for irrigation, but his lands must always constitute a small proportion of his whole farm, and if he converts all the produce of irrigation into live meat before it leaves his property. Under close settlement schemes, things are very different. Produce is generally sold off the land, and has to be transported to the markets. In future I hope to see fibre plants and sugar-beets, and perhaps cotton, grown under irrigation, but these industries have yet to be established, and a vast amount remains to be done in the way of improvement in the products grown, cheaper production, better transport facilities, and co-operation in dealing with produce, which requires to be worked up before it is marketed. These are some of the reasons why I am strongly in favour of developing irrigation from small or moderate units, and allowing them to extend and later merge into big ones rather than start straight away with large costly projects, which, as we are at present situated, would cause a hopeless glut in the market, and mean ruin to the settlement. We must not think that because American irrigation is capable of expansion at the rate of hundreds of thousands of acres per annum that the same could be done here at our stage of development. The American market is probably unique in its capacity for consumption, and what they cannot consume at home or export they manufacture into some other product for which there is a market. Our home market is probably the worst in any white man's country, and till we can increase home consumption we must grow for export, and here we must not outrun our capabilities.

IRRIGATION WILL EXTEND.

Irrigation in South Africa will extend on a number of distinct lines. First and foremost, by small schemes belonging to single farms, which may be worked from storage reservoirs, from wells or boreholes, or with flood water. Secondly, co-operative schemes, generally of moderate size, but as the farmers become more experienced in irrigation matters projects like the proposed Ashton Canal, to irrigate 40,000 acres and more should be quite feasible. Thirdly, close settlement schemes, in which the Government owns the irrigable land, constructs the works, and sells the land in small blocks to suitable men under a system by which, after a given number of years, the settlers will become owners of both land and canal works. Fourthly—and finally—large State-owned schemes in which water is sold to the irrigators. For the present the first and second of these types—*i.e.*, individual private and co-operative schemes—offer the greater scope for successful development, and will always be the dominating type. They are more likely to keep pace with developing market conditions, and are peculiarly fitted to the development of a spirit of progressive farming, as they are much more certain of success and offer the line of least resistance to the breaking down of prejudices to which I have referred at considerable length at the commencement of this address. These peculiar characteristics must be overcome by tactful education, object lessons, and gradual squeezing out of the hopelessly incorrigible; but they cannot be overcome by impatient methods which, under present conditions, are apt to lead to dismal failures, the effect of which is a triumph for the retrogressive element. One great hindrance to the extension of the area under these two types is the present very large area of most irrigable farms, especially in the East and Midlands. As dry stock farms these large areas were justified, but under irrigation they are far too big for one individual to manage, and their subdivision into a number of smaller properties, each having a moderate area of irrigation, is essential to full development. While this may be described as normal development, our social troubles already alluded to have made the establishment of close settlements, as defined under heading No. 3, a necessity. These settlements will tax our organising powers greatly. We shall have to deal with a most difficult class of people, who must be dealt with tactfully, yet with great firmness, and their methods of work must be under strict control for a long time. The holdings must be sufficiently big to provide a man with more than a living wage. He must be able to better himself. Such schemes should be worked together with co-operative institutions for the working up and marketing of their produce, and there should always be a good leaven of experienced, hard-working men amongst the settlers, who will act as object lessons. Church and State can do great things



A FINE EXHIBIT OF FARM PRODUCE.

This fine show of vegetables was exhibited by Mr. W. Mercer, of Cato Ridge, at the recent Durban Show. The Condensed-milk can in the centre will give an idea of the size of some of the smaller articles—such as the chillies on either side of the tin, the peas on the right, etc.

by working hand in hand in many such schemes. Finally, there are the big State-owned schemes, and my opinion is that for many years to come we can do no good with these in this Colony. They are utterly unsuitable for the poor white class, while the better class farmer has years of work before him on his own lands, and in parts of the Colony better situated for irrigation enterprise than the only likely areas for big schemes. Such big schemes will all be very costly—at present prices of labour and material, largely prohibitive—and that is all the more reason why money should be spent on schemes of the first three types, which are all more certain of success.

I must apologise for detaining you so long, but the subject of irrigation development is so difficult and complex in South Africa that it is difficult to convey the various aspects of it in an address of this kind. I only hope that the main principles put forward, which I think must govern the extension of irrigation in this Colony, have not been obscured by the length of some of my arguments.

If you believe in sheep, but feel as though you couldn't afford to give them your personal attention, buy a few for the boys and give them to them outright. It will be better than a savings-bank account and will give them a fixed interest at home.

Often in the management of farm work the greatest puzzle is the employment of hired help on rainy days. The thoughtful manager will try to so plan his work that harness can be oiled and farm implements fixed up at such times. Many things can be done, as, for instance, peeling fence posts, sorting potatoes, inside whitewashing, clipping horses and a score of other things.

According to the *Standard of Empire* of June 10th, the announcement that the United States is taking steps, by establishing free trade between the Philippines and the American ports, to close the Philippine market to other markets, has led to local inquiries as to whether, in the lessened trade with Europe in Manila hemp which might be expected to follow the restrictions, New Zealand flax would be imported more freely into England.

Alcohol for Industrial Purposes.

SOME NOTES ON ITS USE.

By J. F. E. BARNES, C.M.G., *Chief Engineer, Public Works Department.*

THE following notes on the use of alcohol for industrial purposes, based upon information which has been collected by the Government and upon various magazine articles and books which I have read, I have prepared in the hope that they may be of assistance to those interested in the subject of industrial alcohol.

In the *Engineering Record* of May, 1908, there was published an article referring to exhaustive comparative tests of alcohol and gasoline engines which had been made by the Technological Branch of the United States of America Survey Department. The gasoline engines employed were the standard American Stationary Engine type, 10 to 15 h.p., at speeds of 250 to 300 revolutions per minute; while the alcohol engines were of similar construction and identical in size with the gasoline.

As a result, it is stated that "correspondingly well-designed alcohol and gas engines, when running under the most advantageous conditions for each, will consume equal volumes of the fuel for which they are designed." The average minimum obtained in the tests is given as 0.8 pints per hour, B.H.P., both for gasoline and for alcohol. The air was not pre-heated for the tests for either alcohol or gasoline; the engines were equipped with the ordinary type of construction level suction lift, and construction level spray carburetter.

Special tests with aid pre-heated at 250 degrees, Fahr., were also made, but no beneficial effects were found. The importance of this is manifest. The denatured alcohol used in the trials was 100 parts methyl alcohol *plus* 10 parts methyl alcohol *plus* half of one part of benzol.

No detrimental effects on the cylinders and valves were found. This is reassuring and should help to clear away the prejudice which has existed in that regard; moreover it bears out a statement of Mr. Petchell, of Reynolds Bros., in which he calls attention to the injurious effects arising out of the fact that the spirit which is denatured and sold as methylated spirit in Natal is about 60 to 62 per cent. only and utterly unsuitable for motor car work. It is, however, also explained that even this is not serious when the engine is worked daily, but that the metal of exhaust valves and ports is seriously affected if the engine is simply stopped and left alone for some weeks. But this difficulty, he states, can be overcome by injecting paraffin into the cylinder whilst hot and giving the engine a few turns by hand. "When this has been done the signs of corrosion are entirely absent even after stoppage of several months."

Again, the tests as reported in the *Engineering Record*, show that "the lowest consumption was obtained with the highest pressure which it was found practical to use." For the denatured alcohol the pressure referred to was from 150 to 180 lbs. to the square inch above atmosphere. It is, of course, understood that this comparatively low pressure for alcohol was limited by the unsuitability of the engines which were employed. The safe pressure to which alcohol may be used (200 lbs. per square inch) in properly constructed engines, is immensely greater than that of petrol, and of course this high pressure obtainable from alcohol gives it a distinct advantage over petrol. In this regard the article makes it clear that, though alcohol can be used in stationary gasoline engines, yet its use under these conditions must be unfavourable to alcohol if only because of the fact that gasoline engines are not built to stand the considerably higher explosive pressure which can and should be obtained from alcohol.

During the tests it was also found that "in no instance was the thermal efficiency of gasoline higher than that for alcohol."

Altogether it is clear that in such tests alcohol is at present handicapped, and in this regard it is remarked that "the possibilities of altering the ordinary gasoline engine so as to obtain the *best* economy with alcohol are very limited."

There was an interesting article in *Cassier's Magazine* of September, 1906, in which reference was made to the fact of a "Free Alcohol" Bill being about to be introduced in the United States, and to the stimulus such should give to denatured alcohol for power purposes. The Bill referred to has since become law. The article was illustrated with some good photos of alcohol locomotives as built in Germany, and showed some of the purposes for which they are used, as, for instance, for hauling timber in a forest near Darmstadt, for passenger service on a tramway at Lima, Peru, for hauling merchandise on a factory railway near Cologne, Germany, etc. At that date German alcohol locomotives of this description were built up to 32-h.p.

In a catalogue from George Stadel, of Berlin, is shown the "Standard Incandescent Lamp." The 300 c.p. size is stated to consume alcohol at a cost of three farthings per hour; and the lamps are made in various sizes from 40 c.p. up to 300 c.p. The selling price of a 60 c.p. lamp, postage paid, parcels post, is quoted at £2 1s.

Amongst the advantages of the alcohol or spirit lamp may be quoted the following:—

- (a) There is no danger of explosion.
- (b) It is lighted like a gas lamp, and therefore free of the trouble, etc., attendant upon oil lamps.
- (c) It is admirably adapted for the lighting of public places.

- (d) It is available as a stand-by in cases of failure of electric light where such has been installed.
- (e) It should also be most suitable for village lighting, always assuming, of course, that commercial denatured alcohol is obtainable at reasonable rate of cost.
- (f) Another point in its favour is, that for equal illuminating power, the alcohol lamp consumes about one-third of the air, and generally it throws off about one-third of the heat of a paraffin lamp.

A catalogue from Moritz Cohn, jun., also of Berlin, which I have had in my hands, contains ocular demonstration of the extent to which the Germans have brought into practical use alcohol for lighting and heating purposes, as, besides lamps, there are obtainable heating stoves, spirit lamps, flat-irons, etc., at moderate rates.

"The Fuels Committee Report," issued by the Motor Union of Great Britain and Ireland in 1907, is particularly deserving of perusal as it deals with the subject of alcohol for motor and industrial purposes practically from A to Z, and much that is of interest I must pass over in order that my remarks may be confined to reasonable limits.

On the question of cost the evidence adduced by the committee showed that it was possible to manufacture "pure alcohol" (from peat) at a cost as low as 3d or 4d per gallon, that 11½d. may be taken as the English rate of production, that the price of alcohol of commerce, as at present, is affected by the fact that in order to meet Excise Regulations it has to be "denatured" and is subject to heavy duty, which together raise the price to 2s.

Prominence is given to the fact that, in Germany, the consumption of spirits for industrial purposes had, in the six years previous to 1907, grown from 15½ million gallons per annum to 26 million gallons per annum, while during the same period Great Britain comparatively stood still.

In Germany, alcohol is largely produced from potatoes, though beet is also made use of, but apparently the most economical source is sawdust, brushwood and refuse being also used for the purpose. The enhanced value of timber in any country where alcohol is free for industrial use is obvious. Referring to this view of the matter, it is remarked that in Norway, Sweden, and America, and such like countries, "it seems as though it will be possible to make alcohol in the near future at such a price that it will become the fuel."

The wisdom of the German Government in fostering afforestation and allowing the chemical industry to have "duty free" alcohol (since 1891), is commented upon. The comparatively small loss of direct duty to that Government has, it is shown, been many times recouped by the

prosperity which has accrued to the country as the outcome of this far-seeing policy. Germany has thereby practically secured the world's trade of dyes, drugs and artificial perfumes, while "to encourage agriculture and to retain within the kingdom some portions of the enormous sums being expended for oil, for lighting and power, the German Government put forward a system of taxation and excise which encourages the cultivation of potatoes and the establishment of distilleries in potato-growing districts" (*vide* page 58). As a direct consequence, the annual potato crop, which in 1887-91 averaged 27 million tons per annum, had in 1901 grown to 40 million tons. About three-fourths of all the alcohol produced was made from potatoes, thus adding enormously to the area of cultivated land, while at the same time encouraging the settlement of a large population in healthy occupation, and so obtaining a direct advantage as regards the physique of her people over those countries which depend upon the industries and manufactures confined to cities and towns.

It is explained that, although grain contains a larger proportion of starch, yet potatoes will always be the more economical source of fuel alcohol, because the yield per acre is so much greater, *e.g.*, where an acre of grain will yield $8\frac{1}{2}$ cwt. of starch, an acre of potatoes yielding a crop of 125 cwt. will give 22 cwt. of starch. A ton of potatoes is reckoned to yield up to 30 gallons of 90 per cent. spirit, and bearing in mind that the best potatoes may be sent to the ordinary market, and that the remainder fully answers the purpose of the distilleries, it is evident that the value of the potato crop is thus greatly enhanced.

The entire report is so full of telling facts and figures that an interesting article which would fill an entire number of the *Agricultural Journal* from cover to cover might easily be made up of extracts and comments, but the outstanding conclusions arrived at are as follows:--

- (a) Alcohol can be cheaply produced from sawdust, potatoes, molasses and many other everyday forms of vegetation, including mealies.
- (b) The spirit is entirely suitable for motor power.
- (c) Being a home production it is therefore, at any reasonable price, more economical and of much greater value to the particular country in which it is produced than petrol or other imported fuel. This phase of the question is particularly applicable to Natal.
- (d) The "flash point" of alcohol (60 per cent. Centigrade) is much higher than of petrol, which is anything down to 10 degs. below freezing point, hence it can be carried and stored with much less risk and without the restrictions attaching to petrol.
- (e) The fumes of alcohol are comparatively innocuous.

- (f) With carburettors giving complete combustion, and with due attention to ordinary details, suitably denatured alcohol is free from corrosive action.
- (g) The thermal efficiency of alcohol is nearly double that of petrol.
- (h) In the event of alcohol taking fire it is easily extinguished by water. In this respect alone it has a great advantage over petrol.
- (i) Benzol as a denaturant is recommended, as, while it renders alcohol undrinkable, it is at the same time free from the disadvantages of other denaturants with respect to its employment for motor or stationary engines, and above all it is cheap.
- (j) As benzol is a by-product of coal and of coke, its adoption in connection with alcohol distilleries for industrial purposes would be highly beneficial to Natal collieries.
- (k) Practical limit of compression is 200 lbs. per square inch, and its explosive pressure much higher than petrol, which, in view of possible pre-ignition, is limited to 80 lbs.
- (l) The less rapid propagation of the alcohol flame gives a more uniform pressure throughout the stroke.
- (m) The denaturing agent used in Germany consists of a mixture of methyl alcohol, 1 per cent.; benzol, 2 to 20 per cent.; pyridine bases, $\frac{1}{4}$ per cent.; methyl violet, $\frac{1}{4}$ per cent. of a solution.
- (n) In Germany, while the alcohol motor has been established for years, especially for agricultural engines, it has not been used for motor cars, because the best customers are in England and other countries where petrol has been the only fuel used. It would not pay the Germans to manufacture alcohol motor engines for their country alone.

The recommendation of Mr. Neville, Government Chemist, to the effect that experiments with alcohol lamps should be made at various railway stations where electricity is not available, is being acted upon by the General Manager, N.G.R.

Mr. Pay, Inspector of Explosives, has ascertained that there are at least three firms now in Natal manufacturing alcohol, and in his opinion all manufacturers of sugar on a large scale would in all probability manufacture alcohol from molasses.

Mr. Pay also reminds us (1) that the world's petrol supply is fast becoming exhausted; (2) that alcohol is the only fuel with which it will be possible to replace petrol; (3) that Natal is essentially an alcohol-producing country.

Messrs. Hart, Parr & Co., Charles City, Iowa, U.S.A., inform us that they have equipped some of their engines for alcohol, and it is "by far the best fuel they have yet used."

It is reassuring to learn from Messrs. Crossley Bros., Ltd., Manchester, that they have for several years made engines to work with alcohol, "but chiefly for two or three foreign countries where alcohol is cheap and easily obtainable." This is proof, therefore, if such were wanted, that the selling cost of denatured alcohol is the crux of the whole question.

Mr. E. R. Sawyer, Director, Division of Agriculture and Forestry, Cédara, as the result of personally conducted experiments, expresses himself strongly in favour of alcohol as fuel, and remarks, "cost has heretofore been prohibitive." He is prepared to undertake laboratory determinations of the percentages of alcohol obtainable from different crops in Natal. Such should be a valuable guide to those who contemplate taking the matter up.

I would add that Professor Duncan, in an admirably written work entitled "The Chemistry of Commerce," printed in the U.S.A., 1907, gives a chapter on Industrial Alcohol, which I would commend to the attention of farmers, planters, manufacturers and commercial men in Natal. As to cost, he states that denatured alcohol may be produced in America at from 1s. to 1s 3d a gallon, and further that two gallons molasses furnish one gallon alcohol, and a bushel of maize yields about 2·7 gallons (American) of 35 per cent alcohol. In Cuba such alcohol sells at a price of 10 cents (5d.) a gallon. Presumably this refers to pure and not denatured alcohol. He reminds us that the price of gasoline, and therefore of petrol, is sure to rise as the supply diminishes.

For the development of suitable engines we may, in Professor Duncan's opinion, confidently look to the inventive faculties of America now that the Free Alcohol Bill has thrown alcohol open for industrial use.

With respect to Excise Regulations the following quotation should be of interest:—"By the amendment of the Free Alcohol Law (which was expected to take effect on the 1st September, 1907), the manufacture of alcohol will no longer be confined to the industrial distilleries, but just as in Germany, farmers, and communities of farmers, may freely make it for industrial purposes. This they may do by distilling it into sealed tanks in which the alcohol may be denatured on the spot, or which with the contents may be transferred free of tax to central denaturing establishments. In the regulation of this, the Commissioner of Internal Revenue is given a free hand"

Seeing that Germany and America have solved the questions of cost and of excise enabling alcohol to compete with petrol and ordinary paraffin, what is there to prevent Natal or South Africa being equally successful?

Mechanically Propelled Vehicles as Feeders to the N.G.R.

By W. G. KEMP.

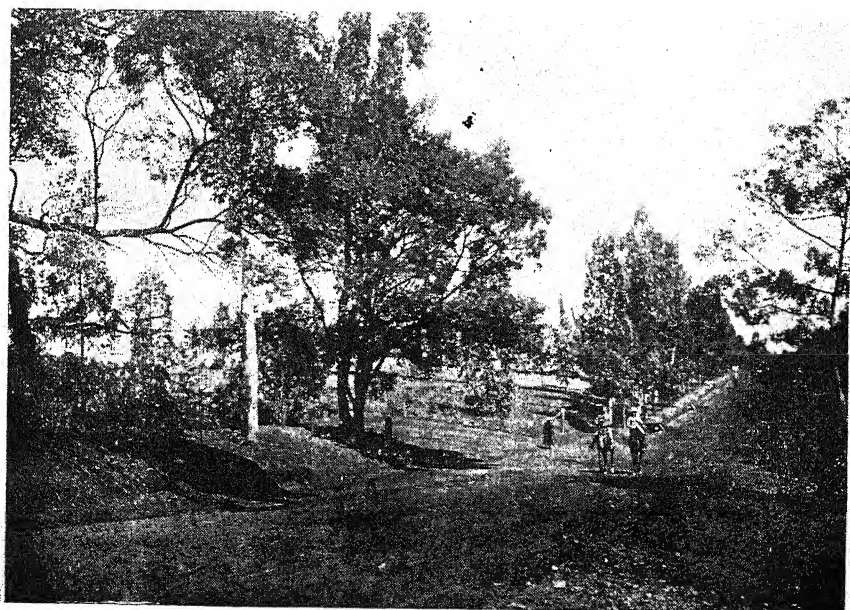
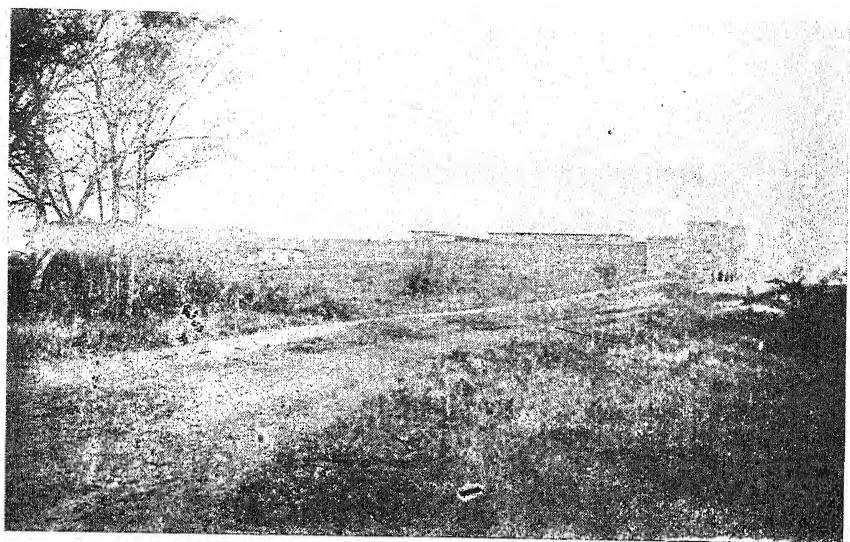
[NOTE.—The following article has been sent to us by the writer, Mr. W. G. Kemp, as one that is likely to be of interest to readers of the *Agricultural Journal* in view of the discussion on Mechanical Road Traction which took place at the recent Conference of the Natal Agricultural Union. The article originally appeared in the *South African Railway Magazine*, to the Natal Editor of which we are indebted for the loan of the blocks illustrating the article.—ED.]

THE progressive agricultural and mineral development of Natal is severely handicapped by the lack of cheap efficient transport from outlying districts to the nearest railway station. Vast tracts of fertile virgin soil, at the present time lying idle, if scientifically cultivated, would undoubtedly be paying propositions, and offer sound inducement to capitalists for investment, provided that reliable transport could be obtained at reasonable rates to the nearest point of communication with the railways.

One of the principal obstacles to be overcome in the development of the mineral resources of this Colony is the provision and upkeep of a system of transport from the mines to the railways that would be efficient and economical. Not before this difficulty has been overcome can we expect the favourable consideration and support of the money market in mining propositions in Natal, no matter how bright the prospects or alluring the prospectus.

Owing to the ravages of the various animal diseases prevalent throughout the Colony, and the stringent East Coast Fever regulations prohibiting the movement of cattle in certain areas, the use of the primitive mode of transport by oxen so long in vogue, yet so antiquated in this progressive age, is practically prohibited, and as a result the agricultural and mineral development of many promising districts is practically at a standstill. In other districts the only mode of transport to be obtained is by mules; but the condition of the roads, combined with the excessive cost, although compensated to a degree by increased speed, is altogether out of the question where working expenses is a prime factor in the production of dividends to the satisfaction of captious shareholders.

The thought naturally suggests itself that the introduction of



VIEWS OF THE MAIN ROAD, ESHOWE.

(See Article on "Mechanically Propelled Vehicles as Feeders to the N.G.R."
Blocks by Courtesy of "S.A. Railway Magazine."

mechanically propelled vehicles for transport purposes would not only accomplish this end, but should, all things being equal, be attended with the same measure of success as in other countries. The question then arises whether the initiative should be taken by the Railway Department or private enterprise. Strictly speaking, and on lines of precedent, it is essentially railway enterprise to spare no effort to attract traffic to its lines and open up new districts, with the aim always in view of tapping fresh sources from which revenue may be derived.

The railways of Natal being controlled by the State and worked for the benefit of the community as a whole, it may therefore be assumed that the initial cost of mechanically-propelled vehicles as feeders to the railway—introduced with a view to opening up new districts for agricultural and mineral development, and to bring outlying districts into direct communication with the railway by means of reliable transport at reasonable rates—should be borne by the State.

With the advance of civilisation, and from a revenue-earning point of view, the days of the transport rider feeding the railways are past. It is in the interests of the community and future prosperity of the Colony (or Province) of Natal that the Railway Department should follow in the steps of the Home railway companies—who have shown a commendable enterprise in this connection—and introduce mechanically-propelled vehicles to carry mails, passengers and baggage, with one or more trailers for the conveyance of goods, and to act as feeders to the railway in districts where the roads are suitable and the construction of expensive branch lines not yet warranted.

The class of cars required for the districts it is decided to exploit by this means of transport is a matter for technical experts to decide after exhaustive inquiries have been made into (a) the condition of the roads, gradients, etc.; (b) spruits to be negotiated both in dry and wet seasons; (c) population (European and native); (d) approximate revenue derived from conveyance of passengers, mails, baggage, and goods under the present mode of transport; (e) estimated increase in traffic from increased facilities offered by the proposed improved transport for the further development of the agricultural and mineral resources of the district.

The car eventually selected for the work should be provided with a view to coping with the normal increase of traffic during the life of the vehicle due to regular and accelerated service combined with economical rates.

The Albion car shown has every appearance of being a serviceable vehicle for the conveyance of passengers, mails, baggage, and limited quantities of goods. It would be, all things being considered, more adaptable to Colonial requirements if it were treble the horse-power, say, 50 h.p., and capable of hauling one or more trailers for the conveyance of general goods, according to local requirements.

The cost per annum to the Postal Department for post-cart services in the Colony is £7,133, and if the contracts in the districts in which motor transport had been introduced were transferred to the Railway Department, this would subsidise these vehicles in the form of a fixed annual revenue, and would not only ensure a regular service, but should foster lucrative passenger traffic over the railways. The growing tendency of the age is to travel, but the inducement must be that long distances may be covered in "luxurious" ease and comfort without fatigue.

There are two districts that have special claims over all others for consideration, and to which this scheme of transport is applicable, and, theoretically speaking, eminently adaptable, namely, Port Shepstone-Harding, on the South Coast, and Ginginhlovu-Eshowe on the North Coast, for the reason that not only has provision been made in the past for either a continuation of the line or the construction of branch lines through these districts, and which projects, notwithstanding the importunate demands of the inhabitants, have, through continued depression and diminishing receipts, had to be reluctantly abandoned by the Government, and to all appearances shelved for some considerable time to come.

The Port Shepstone-Harding district (Alfred County) is undoubtedly one of the most promising agricultural districts in Natal, with its extensive wattle plantations, and natural facilities for profitable dairy farming, mealie, tobacco, and fibre cultivation; and there is also the prospect of the exploitation of its mineral resources, principally graphite, in the near future. But at the present time all further progressive development is severely handicapped by inefficient and costly transport to the nearest point of communication with the railways. It is obvious that this district would justify the establishment of mechanical transport, but it must not be overlooked that a considerable expenditure would have to be incurred in improving the roads before mechanical transport would be a practical proposition. From the present mode of transport between Port Shepstone and Harding there is, from available information, derived approximately a revenue of £5,000 per annum, inclusive of the postcart subsidy (£950), which amply demonstrates the urgent need for improved facilities.

Eshowe, the principal town in Zululand, has a population of about 700, is 17 miles from Ginginhlovu, and situated in a district the mineral potentialities of which has not yet been ascertained, and can never be fully exploited until modern transport supersedes the primitive mode in vogue at the present time. This district has everything to commend the adaptation of mechanically-propelled vehicles to local conditions and requirements, and for the further development of its mineral and agricultural resources. Possessing one of the finest metalled road connections with the railway in the Colony, the steepest gradient being 1 in 12 for very short lengths, therefore the ruling grade may be taken as 1

in 15, which is not an insurmountable difficulty to specially constructed cars for the service. There is only one river (Inyezane) to be negotiated, although, without a bridge, the drift is a good one, and notwithstanding an exceptionally wet season (1908-9), it has not been impassable for vehicular traffic during this period of the year.

So far as can be ascertained approximately at the moment, with the present mode of transport there is conveyed annually between Ginhlovu and Eshowe 1,000 passengers and 1,140 tons of general traffic, yielding an approximate revenue of £3,240, inclusive of the postcart subsidy (£500), and if the cost of transport to Eshowe of 300 passengers and 660 tons of goods for Melmoth and beyond is included (£1,140), this gives a total revenue per annum from this source of £4,640 under existing conditions. All things being considered, there appears to be every inducement to further exhibit that spirit of enterprise which has gradually developed the railway system of Natal from two miles in 1860 to 988 miles in 1909, by introducing mechanical transport to meet the growing requirements of the Colony. The writer has purposely refrained from quoting statistics compiled from the results of the working of these vehicles in the Homeland and elsewhere in support of their utility as feeders to the different railway systems in which they are in vogue, as the conditions under which excellent results have been obtained have no comparison with the difficulties to be overcome, and distinctly peculiar conditions which obtain in Natal, and cannot therefore be taken into consideration in forming an estimate of the probable results of the working of motor tractors to and from Eshowe, or in any other districts in which they may be introduced.

The foregoing is based more on observation than expert or technical knowledge of the subject, and is put forward through the medium of this *Journal* merely as a suggestion in embryo to arouse interest in a scheme of transport which may possibly play an important part in the near future in connection with the progressive development of the resources of Natal, and will no doubt receive the thoughtful attention of those who take more than a passing interest in the railways and their relationship to the State.

It should be every farmer's ambition to have his farm entirely fenced. It adds greatly to the value of the farm and will add greatly to the peace and comfort of the neighbourhood.

A Preventive for Fowlsickness.

AN interesting theory as to the reason of the prevalence of fowlsickness and other ills affecting our poultry and keeping the industry back has been propounded by Mr. C. Devonshire, in the course of an article in the *South African Poultry Journal* for June 11th. His idea—and it seems a logical one—is that the diseases from which all classes of poultry suffer so heavily at times are due to a deficiency of certain mineral salts in the soil of this country; and he proposes a remedy which is within the reach of everyone to make use of since the ingredients are cheap, and the mixture when made up should not cost more than 3d. to 4d. per pound. Common salt, Epsom salts, sulphur, charcoal and bone, are among the principle constituents of Mr. Devonshire's formula; and whilst many breeders have, of course, been using these substances for years, they have only used them in a tentative way and not as a scientific combination filling an absolute necessity in the fowl's weekly ration.

We reproduce Mr. Devonshire's article herewith in full, and we think no apology is due from us for doing so. Mr. Devonshire, as readers will see, gives his formula, so that everyone is at liberty to give it a trial.

But the theory is of wider application than at first sight appears. During show week in Maritzburg we had the pleasure of a visit from the Editor of the *South African Poultry Journal*, and in discussing this article he pointed out that it was within the bounds of possibility that the supplying of these mineral salts to animals of the bovine species would have the effect of giving the blood of such animals power to retard, if not altogether to prevent, the growth of the East Coast Fever piroplasma upon its entry into the animal organism through the proboscis of the tick. This is an application of Mr. Devonshire's theory which is worthy of investigation; but for the present we leave the matter for the consideration of our readers, both as regards the prevention of poultry diseases, and in its connection with East Coast Fever.

Mr. Devonshire's article is as follows:—

"Many of us keep fowls and keep them successfully, from our own standpoint, which is that they do not die from disease. How many people have said to me, 'I never lose any fowls from sickness.' And so unconsciously the criterion of success with poultry, comes to be limited to this that they do not die from sickness.

"Let us set out with another standard of success, *i.e.*, to produce chickens which will reach the maximum weight in the shortest time at the least expense.

"If such is our motto, we at once perceive that it involves a consideration of the fowl as a purely artificial animal. We keep fowls for profit primarily in most cases and the pleasure is increased in proportion to the profit.

"In this article, I wish to dwell upon one of the principal sources of supply to the fowl of the material for the framework of the body (the nourishment of the bone, that is), and the maintenance of the materials essential to the proper functioning of the blood; the liver, gastric juice, etc., what the Government Chemist of the Transvaal Agriculture Department calls 'the processes of life.'

"We are constantly told that the offspring of imported stock in this country tend to diminish in size, below that of their parents. This is undoubtedly true, but it is more than doubtful whether the contention that this diminution in size must *necessarily* take place as part of the inevitable result of growing fowls in this country, is equally true. Personally, I am satisfied that the loss of size and general tendency to deterioration is due to preventible causes. *Prima facie*: birds bred in this beautiful dry climate should tend to increase in size over that of their parents.

"We must conclude, therefore, that there is probably some shortage in the foodstuffs in South Africa, which more than counterbalances the advantages which would otherwise accrue from the climate to the bird.

"Such, in fact, is the case: The writer has bred between 4,000 and 5,000 birds (chicks and ducklings) since the war, either in the O.R.C. or Transvaal, and the evidence is overwhelming, and is conceded to be such by the Government experts, that of themselves, our foodstuffs are not of the same feeding value as the corresponding foodstuffs in Europe.

"There is something missing. What is it? Let us take a practical example. Let us burn 100 lbs. of lucerne, and we shall find that there remains some 6 or 8 lbs. of material which will not burn. This is known as the 'ash' in the foodstuffs. It is roughly composed of 8 materials in combination—known, I believe, to chemists as 'salts,' although to us laymen that word 'salts' suggests a more limited, not to say disagreeable, application.

"The importance of these salts or ash in the foodstuffs as regards the part which they play in enabling the body to functionate properly has been overlooked.

"I remember the late Government Chemist to the Transvaal saying to me that, speaking roughly, 'You may say that nitrogenous matter (such as blood, meat, etc., in animal food, and the proteins in grains), compose the body, *i.e.*, the machinery—the fats (largely found in mealies and present in all foods) supply the fuel to drive the machinery, while the mineral ash represents the few drops of oil without which the machinery will not work.' Nine-tenths of our trouble with our poultry consists in this that these few drops of oil are deficient in amount—hence the tendency to loss of size, liability to liver disease, general debility, and a fatal facility for contracting catarrh, diarrhoea, roup, etc.

"The 'processes of life' are dependant for their maintenance, not

upon the proteins, carbohydrates or fats in the food given, but upon the mineral ash or salts found in that food.

"As we have said, experience, which is our best guide, tells the practical poultryman that for reasons which need not be discussed here the supply of the mineral ash to his fowls is in the vast majority of cases inadequate.

"As practical men, we need not trouble to inquire the scientific why and wherefore of everything—all we need to know is this:—Does the artificial addition of these 'salts' to the ration of our birds produce results which are sufficiently pronounced to justify us as practical men in believing that we have discovered the chief cause of our troubles with the poultry?

"The writer bred 1,100 birds last year at Barberton, Transvaal, *i.e.*, some 600 ducklings and 500 chickens. There salts were supplied to chicks and ducklings alike. The parent stock consisted of 70 common hens and 20 common ducks. One 200-egg Petaluma Incubator was used and one 50-egg ditto. A brooder house of reeds and an incubator house of the same material comprised the plant. The results justify us in asserting that poultry in this climate, if supplied with the missing material, tend to increase in size over that of their parents.

"We now have some data on which to work as to what weights our chicks should reach at any given age. If we can get our pure bred Wyandottes, Orpingtons, or Barred Rocks to scale $\frac{3}{4}$ lb. at six weeks old, we should have done very well. So again, a common or puddle duckling which weighs 4 lbs. at nine weeks is an excellent result to obtain for the majority of busy farmer's wives.

"To produce these results, it is essential to reinforce the supply of mineral salts which are naturally available to the bird in the foodstuffs given.

"We have pleasure in placing at the disposal of our fellow-poultrymen the formula which we have used with such remarkable results for over two years.

THE FORMULA.				Parts.
Common Salt	...	...	...	30
Phosphates of Soda	...	...	...	9
Calcium Fluoride	...	...	...	1
Ferrous Sulphate (Green Vitriol)	...	...	...	1
Bone Ash	...	...	...	30
Chalk	...	...	...	14
Epsom Salts	...	...	...	10
Charcoal	...	...	...	2
Sulphur (Flowers of)	...	...	...	3
				—100

Give one tablespoonful twice a week in every 5 or 6 lbs of bran and mealie meal (use two parts bran and one mealie meal).

We unhesitatingly affirm that in the vast majority of cases fowl-sickness, so called, is due to a prolonged starvation by the fowl of the above salts.

"Try it and see for yourself, my fellow poultrymen."

Pineapple Cultivation.

By H. C. HENDRIKSEN and M. J. LORNS, *Horticulturists, Porto Rico
Agricultural Experiment Station.*

(Continued from Page 740, Vol. XII.)

METHODS OF PLANTING.

THE methods of planting now followed range from single rows, 6 feet apart, planted on a ridge, to 20 or more rows, 15 to 18 inches apart, planted on level ground. All of the methods have strong advocates, and it is simply a question of which method is best adapted to certain fields, considering all of the factors that can enter into the discussion. Let us first consider a sandy soil, well drained and free from joint grasses. If the sand is comparatively coarse, the ground water not within 2 feet of the surface, and the lay of the land such that the surface water can drain off quickly, the problem is very simple. Such land should without question be planted in wide, level beds.

If the sand is fine and the drainage not perfect, the soil should be bedded up. The height and width of the beds will depend entirely on local conditions. If there are no noxious weeds to combat, the beds should be as wide as it would be possible to make them and not higher than absolutely necessary to insure good drainage.

In loam and clay soils the considerations are: To keep the soil aerated, to get rid of an overabundance of water in the shortest possible time, to be able to keep the soil free from weeds, and to prevent the fruit as well as the plants and suckers from falling over.

THE SINGLE-ROW SYSTEM.

In the single-row method the plants are set from 12 to 22 inches apart in rows from 2 to 6 feet apart. The beds are usually made by ploughing two furrows together, and practically no hand work is needed. This system is not well adapted to sandy soils because they dry out too quickly; neither is it well adapted to heavy clay soils for the same reason, unless the beds are made wider. In a friable loam there seems to be no objection to one row in a narrow bed, as far as the soil is concerned. If the rows are far enough apart the system has the advantage of easier cultivation, which may to some extent be done with a horse cultivator; on the other hand, there are larger vacant spaces which it is necessary to cultivate to keep clean. If the land is full of joint grasses the one-row system is well adapted, because it is possible to enter the beds and weed, while in the wider beds this is practically impossible.

The great objection to the one-row system is that as soon as the fruit attains any considerable size it does not remain in an upright position, and when, in leaning to one side, it does not receive support from neighbouring plants it bends further, until it reaches the ground. In that position it is subject to sun scald on the upper side, and will be unfit for shipment. Also, after harvesting the fruit, the suckers left on the plant are liable to be blown off, and, even if they remain in an upright position until fruiting, the weight of the fruit is almost sure to bend them down. Such beds, therefore, should not be continued except by leaving the ratoons and the very lowest suckers or else replanting.

THE DOUBLE-ROW SYSTEM.

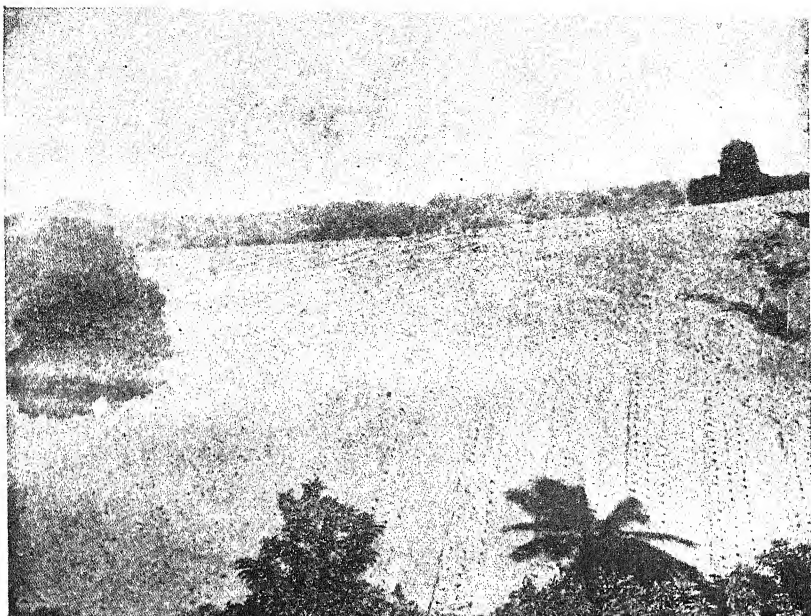
For double rows the beds are laid off by ploughing several furrows together and using some hand work in finishing off. The plants are set from 12 to 22 inches apart each way, leaving a margin of 6 inches or more on each side of the bed. This system can be used in any kind of soil. It has practically all of the advantages of the one-row system and the disadvantage of plants and fruit falling over is greatly reduced, although it leaves considerable to be desired in that respect. In soils that are inclined to be weedy the two-row system is preferred to any other, but in comparatively clean soil, and especially those containing no joint grasses, beds wide enough to plant from three to six rows of pines are preferable.

THE THREE TO SIX ROW SYSTEM.

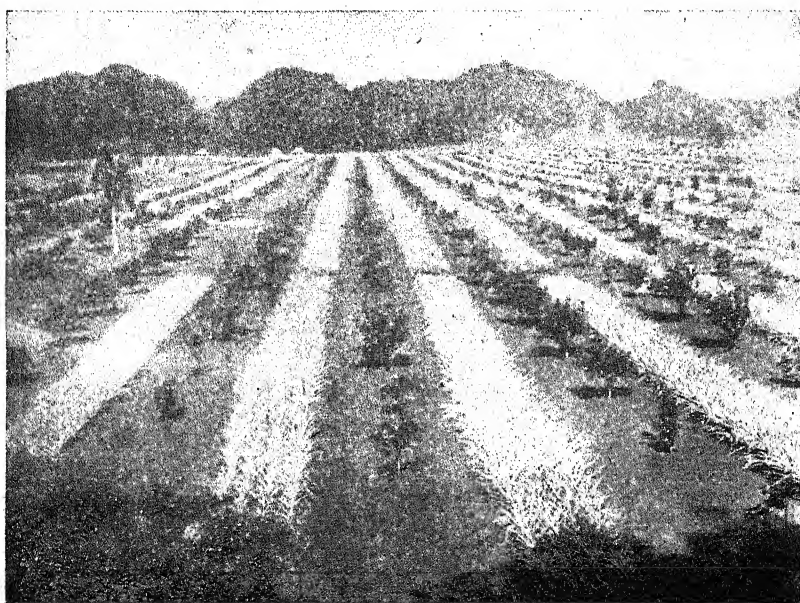
In making beds for the three to six-row system the same method can be used as for the one and the two-row beds, but considerable hand work is needed besides. It is good practice to leave a space of 6 feet between the beds, which should be excavated so as to leave the top of the beds at least 12 inches above the bottom of the walk between the beds. If the plants are set 15 inches apart and six rows to the bed it would require beds fully 7 feet wide. This is not too wide for working easily, provided the land is not weedy, while it almost completely eliminates the falling over of plants and fruit. It has been found, however, that where the soil is not physically well suited to pineapples the rows in the middle of the bed do not produce as well as those on the outside, and one should therefore carefully consider the conditions before laying off the beds by this method.

THE WIDE-BED SYSTEM.

In the method known as the "wide-bed system," the land is marked off with the rows about 18 inches apart and the plants set in perfectly straight lines, which may be as long as the field, but for the sake of



Cabezona Pineapples on Station Grounds. Three-rowed System of Planting.



Pineapples and Oranges, Vega Baja.

PINEAPPLE CULTIVATION.

(See Article.)

passing through the field there ought to be a roadway of 8 feet for every 200 feet of bed. The width of the bed is made 30 to 50 feet, according to the distance a man can throw a pineapple. In harvesting the fruit one man goes into the bed and breaks off the fruit and throws it to a man in the roadway, who catches it and places it in baskets or boxes, which are then hauled to the packing houses. In practice, beds 30 feet wide with roadways 8 feet wide, together with crossroads every 200 feet, make a very convenient field.

PREPARING THE PLANTS.

The young plants, whether suckers, slips, or crown, are covered with leaves to the very tip of the base. In stripping these leaves off and exposing the stem a number of excrescences will be seen, which are the root buds, some of which may be already developed into roots of considerable length. Many planters maintain that it is necessary to trim the plants—that is, to cut the tip of the base and to strip the leaves off for a distance of 1 to 2 inches. Other planters maintain that this process is not at all necessary. Why is this? The reason is simply the difference in local conditions under which the plants are grown. If a slip is planted without trimming in a dry, sandy soil, the roots will form, but instead of spreading out in the normal fashion they will wind around the stem under the leaves. There are two reasons for this; one is that on account of the dry soil the leaves covering the stem remain hard and dry and the roots would have to overcome great resistance in order to penetrate them; they therefore follow the course of least resistance and develop under the leaves. The other reason is that the plant catches a great deal of dew and water from light rains, which is retained in the heart and leaf axils, from which it trickles down around the base and makes the condition there favourable for root formation, while at a distance of an inch or more from the stem the soil is drier. This growing of the roots around the stem is called in Florida “tangle-root,” and there plants are trimmed in order to insure the desired root development. If the plants are set in a loamy or clay soil that contains considerable moisture, the leaves covered up with soil will decay in a short time, and as the soil is as moist a distance away from the plant as close by the roots will spread out just as well as if the plants had been trimmed. Therefore for planting in a dry soil or in a dry season, trim, but for planting in a moist soil or in the rainy season the work is not worth the cost.

The trimming consists in cutting off the base and stripping off the lower leaves, leaving an inch or more of the stem exposed. If large suckers are planted it is quite common to cut the ends of the leaves off, but this not desirable, because cutting or breaking the leaves lowers the vitality of the plant.

PLANTING THE FIELD.

The beds being prepared according to the desired system of culture, the rows can be marked off either with an ordinary marker or with a line, but whichever method is used the rows should be straight. The distance between the rows, as well as between the plants, will vary according to the variety and also according to the soil and the system of planting. Pineapples, no matter what variety, do not have an extensive root system, and when planted in single rows 12 to 15 inches apart they have enough room for root development. In beds with several rows, 15 to 18 inches for Spanish and other small varieties and 24 inches for Cabezona and other large varieties is space enough. Under no circumstances should pineapple plants be set over 24 to 30 inches apart in the row, because it is waste of land, it leaves too much soil uncovered, and increases the work of weeding, while it gives no support for the plants and the fruit.

In planting it is a good plan for one man to drop the plants the desired distance apart and another man to follow with a blunt dibble with which to make holes $1\frac{1}{2}$ to 3 inches deep, according to the size of the plants. The base of the plant is inserted into the hole and the soil pressed firmly down with the dibble and with the foot.

The number of plants per acre will differ, depending on the system of planting adopted. The following table gives the approximate number of plants per acre for the different systems of planting:—

APPROXIMATE NUMBER OF PLANTS PER ACRE.

System of Planting.	Varieties.	Distance apart of plants in rows.	Width of paths between banks.			
			3 feet.	4 feet.	5 feet.	6 feet.
		<i>Inches.</i>				
Single row	Small	12	14,520	10,890	8,712	7,260
	Large	15	11,616	8,712	6,960	5,808
Double rows	Small	12 by 12	21,780	17,424	14,520	12,440
	Large	15 by 15	16,366	13,282	11,022	9,504
Three rows	Small	15 by 15	19,038	16,032	13,926	12,324
	Large	18 by 18	14,520	12,445	10,890	9,379
Four rows	Small	18 by 18	15,488	13,620	12,232	11,120
	Large	24 by 24	9,689	8,712	7,920	7,260
Five rows	Small	18 by 18	16,133	14,520	13,200	12,100
	Large	24 by 24	9,900	9,075	8,377	7,778
Six rows	Small	18 by 18	16,594	15,151	13,939	12,906
	Large	24 by 24	10,050	9,334	8,712	8,166
Thirty rows	Small	18 by 18	18,639	18,639	17,889	17,514
	Large	24 by 24	10,710	10,539	10,371	10,209

HOW THE PINEAPPLE PLANT GROWS.

If the soil in which the pineapple plant has been set is moist, root development will take place at once and the roots will be able to take up the food elements as soon as needed. These elements in solution are carried through the roots up to the stem and to the leaves. In the leaf cells, by action of the sun and the green colouring matter which we call "chlorophyl," these food elements from the soil and carbon dioxid from the air are combined with water into food for the plant in ways not yet fully understood. This food consists of many complex chemical compounds, the best known of which are the sugars and starches. From the leaves the food is carried in solution to all parts of the plant wherever needed. Both sunshine and chlorophyl are necessary to the formation of the principal food, so that a leaf losing its colour loses its power to form food. It is thus seen how important a large, healthy leaf is to the formation of a good fruit.

Food not needed immediately is stored up in the plant tissues, usually in the form of starch, and it is this reserve supply that carries the plant over periods of hardship and vitally enters into the formation of extra-grade fruits. It is probably due to this that, as a rule, the pineapple plants that have a longer period for development will give larger fruit. They have, as it were, more accumulated reserve energy to use in the severe strain of fruit producing.

The root system of the pineapple is shallow and usually does not extend much over 6 inches in each direction. Among the larger varieties it is not uncommon to find a few roots extending 10 to 12 inches from the stem, but the main portions are matted closely together within a distance of from 4 to 6 inches.

The development of the root system is of great importance in considering planting, cultivating, and fertilising. It will be readily understood that the plants can be set as close as 12 inches apart without the roots interfering. It will also be seen that cultivation must necessarily be shallow, especially close to the plants, and in fertilising it would be a waste to spread the fertiliser in the middles, where the rows are 3 feet or more apart.

Where small slips are set in sandy soil it is not unusual to find them filled with sand, especially after a heavy rain or wind. This is detrimental to the plant, and the sand should be washed out by pouring water directly into the heart from a sprinkling can with the rose removed. It may also be prevented by dropping a pinch of cotton-seed meal, dried blood, or tobacco dust, or a mixture of any of these materials, into the heart immediately after planting. This, by filling the cavity, will prevent the sand from entering, yet, unlike the sand, it will not choke the plant.

CULTIVATION.

On account of the shallow root growth and the close planting, cultivation is confined almost entirely to hard work. With the single-row or narrow-bed system some horse work can be done the first season, but after that the leaves interlace and with horse cultivation more or less damage is caused by breaking and tearing the leaves. The extent of the damage compared with the difference in the cost of cultivating will naturally determine the best method to be employed, but some hard work will always be necessary. On the sandy soil in Florida the scuffle hoe is generally used, but on the heavier soils in the West Indies it is necessary to use the ordinary hand hoe, not alone on account of the heavier soil, but also because of the much more abundant growth of weeds. Wherever the land is weedy, cultivation should be strictly attended to, because a crop of weeds is detrimental to the growth of the pineapple plant; and if left to grow, large weeds are much more difficult to eradicate than if attended to in time.

Fix up the farmstead. It makes a living for you and is entitled to your utmost care and respect.

Let the pigs eat all they want but be sure to allow them plenty of room for exercise. If they prefer to lie in their bed turn them out of the pen and fasten the door.

Underdrains prevent the interstices of the soil from becoming blocked or filled with fine particles of earth held in suspension; that is, they prevent puddling, to some extent. Clayey soils shrink if they become dry, and swell when they are wet. Underdrains tend to prevent the swelling and closing of the pores which have been produced by drying. As soon as air is admitted to the subsoil, the dead roots of plants are decomposed and minute drainage channels are formed. One of the effects of drainage is to produce many small channels in the soil, which prevent the formation of large cracks that admit the air too freely and thereby cause excessive evaporation. Underdrains promote fertility by opening up the soil to the oxidising action of the air, and by making the soil more comfortable for the nitrifying organisms.—*Prof. J. P. Roberts ("The Fertility of the Land.")*

Agricultural and Rural Associations.

FIRST INTERNATIONAL CONGRESS, 1910.

MEMBERS of agricultural associations and similar bodies will be interested to know that an International Congress of Agricultural Associations and Rural Demography is to be held in Brussels in September, 1910, on the occasion of the Universal Exhibition there; and since the members of some of our leading societies may be visiting Europe about that time, and be willing to act as delegates from their societies, we publish the following particulars of the Congress.

The Congress will be under the presidency of M. le Baron de Moreau, President du Conseil Supérieur d'Agriculture and some time Minister of Agriculture of France, M. Tibbaut, Membre de la Chambre des Représentants, and M. Callier, President de la Société Royale d'Agriculture de Gand. The aim of the Congress will be to get, in brief reports, "an exact description of the different types of rural associations throughout the whole world, the advantages and disadvantages of which could be studied from all points of view by the persons most competent to give an opinion." The Congress will also aim at studying other important means for improving the conditions of the cultivator, as, for instance, the improvement of public health, the improvement of roads, the reduction of agricultural labour, etc.—questions which have not yet been sufficiently studied in International Congresses. The Congress has no intention whatever of encroaching on the domain of general congresses on such subjects as agriculture, agricultural education, botany, horticulture, the dairy industry, etc. Such congresses treat all these questions from a technical and economic point of view. This one will approach them only from their social side.

To sum up, the Brussels Congress will examine all associations from the point of view of their organisation and progress, without entering into technical details. For the rest, it will confine itself to the study of the influence of these associations on the improvement of the lot of the agriculturist and farmer generally.

The following are the articles governing the constitution of the Association:—

(1) An International Congress for Agricultural Associations and Rural Demography will be held at Brussels in September, 1910, on the occasion of the Universal Exhibition.

(2) The Congress will consist of ten sections in conformity with the programme annexed to the statutes.

(3) Societies and persons may become active members by sending in a subscription amounting to 15 francs to the Organising Committee (Secretary, 220, Chaussee d'Almsberg, Bruxelles).

Administrations, agricultural and horticultural societies, and all bodies having for their object the improvement of agriculture in its widest meaning can take part in the Congress and send delegates. Payment should be made at the rate of one subscription for each delegate.

Persons, associations, etc., who subscribe at least 100 francs have the title of "membres donateurs."

The list of such members will be published.

(4) The Congress will be governed by an Organising Committee composed of the presidents and secretaries of the sections.

The executive of this committee constitutes the executive of the Congress. It is charged with the duty of taking all requisite measures for the preparation and arrangement of the Congress, and with deciding all cases not provided for in the regulations.

The executive of each section will take all necessary measures for carrying out its own programme.

(5) An International Committee will be formed in each country for the purpose of securing members and drafting reports. These committees will supervise the collection of their own funds for propagandist work. Should the funds be insufficient they are allowed to defray their expenses from the subscriptions they receive. These expenses should not exceed 10 per cent. of the subscriptions. Each committee appoints a president, a treasurer, and a secretary. As soon as a group of persons interested in the success of the Congress is formed it may be appointed by the executive to act as a special Propagandist Committee, etc. These committees may be subdivided into sections corresponding to the sections of the Congress.

(7) Papers and discussions may be written in French, German, or English. Other languages are also admitted. But each report must be accompanied by a summary in French, and speakers are required to give to the sectional officer the French summary of their speeches.

(8) Papers should be confined to a short statement of the subject with a special view to the practical means of application and close with a statement or resolution to be submitted to the Congress. Papers may not exceed five pages in octave (of about 40 lines of 10 words).

Communications not intended for discussion may be annexed to the minutes when not exceeding two pages. Papers and communications should give the principal bibliographical information on the question under discussion.

Authors are requested to keep the original manuscript of their papers and to send in a legible copy, if possible, typewritten.

(9) The Executive of the Congress will decide what papers and communications shall be admitted. When many papers deal with the same subject a general reporter may be appointed for this question. Papers not directly concerning the programme will be strictly excluded.

(10) All discussions on the basis of political, philosophical, or religious questions are forbidden.

(11) Papers intended to be printed in advance must be sent to the International Congress office before 1st February, 1910. Papers forwarded after this date may be read or abstracted and inserted on the proceedings. The copyright in papers and discussions belongs to the Congress. The executives reserve to themselves the right of publishing them in extenso or in abstract.

(12) Resolutions adopted by the sections are submitted for ratification at the Congress. They will be accepted or rejected without discussion on their merits. No request for discussions at the general assembly of Congress is allowed. Orders of procedure for the sittings of the Congress and other questions will be published eventually.

PROGRAMME OF THE CONGRESS.

The discussions of the Congress are to be divided under ten heads, which, with their sub-heads, are as follows:—

Section I.—Associations for study, general interest and protection of the trade interests of cultivators:—(1) Federations of agricultural and horticultural societies; (2) central and national societies; (3) official representation of agriculture, horticulture, etc.; (4) various societies.

Section II.—Associations for study and protection of the trade interests of women engaged in agriculture:—(1) Federations; (2) leagues for study, farmers' wives' institutes; (3) societies for agriculture and horticulture; (4) professional syndicates; (5) various associations.

Section III.—Associations for planting and cattle-breeding:—(1) Associations for plant breeding, seed selection, etc.; (2) associations for cattle breeding; (3) associations for breeding minor stock; (4) associations for inspection; (5) various associations.

Section IV.—Associations for manufacture, exportation, sale, etc.:—(1) Associations for dealing with agricultural produce; (2) associations of dairies, cheese factories, etc.; (3) associations for manufacture of preserves; (4) associations for purchase; (5) associations for exportation; (6) associations for preservation of produce, cold storage, etc.; (7) associations for sale; (8) associations for general use; (9) various.

Section V.—Associations for thrift, loan, and insurance:—(1) Associations for thrift; (2) credit banks; (3) associations for cattle insurance; (4) associations for insurance of minor stock; (5) various.

Section VI.—Demography and hygiene:—(1) Birth, marriage and death rate; (2) hygiene of clothes; (3) hygiene of food; (4) hygiene of dwellings; (5) societies for diffusion of principles of hygiene; (6) societies for encouraging the building of houses in the country.

Section VII.—Agricultural labour:—(1) Leagues for the protection of agricultural labour; (2) agricultural labour exchanges; (3) conveyance of agricultural workmen; (4) reduction of labour by agricultural engines; (5) mobility of agricultural labour. Emigration; (6) home industries in agriculture.

Section VIII.—Means of conveyance in agriculture:—(1) Agricultural roads—their construction; (2) the creation and straightening and public acquisition; (3) communications between rural properties; (4) leagues for the improvements of roads; (5) other means of transport.

Section IX.—Other measures aiming at the improvement of the lot of cultivators:—(1) Societies for the well-being of cultivators, and against rural depopulation; (2) æsthetic of the farm and the village; (3) water distribution; (4) public lighting; (5) popular games.—Pleasure societies. Popular songs and feasts; (6) diffusion of small holdings. Acquisition of estates to be retailed; (7) construction of rural dwellings; (8) vegetable and fruit culture for workmen.

Section X.—Documents, intelligence, exhibitions:—(1) Organisation of the publication office; (2) organisation of intelligence departments by agricultural associations; (3) organisation of enquiries; (4) organisation of special lectures on rural associations; (5) organisation or exhibitions of agricultural associations; (6) organisation of the press of agricultural associations (central translation office, etc.)

If you are in doubt as to which are the most unprofitable ewes in your flock, consult the lambs. The lamb is the ewe's passport, and if the passport is not good the ewe's character should be looked into.

Milch cows should always have plenty of pure water to drink. The best water comes from a good well with the surroundings clean and right. A clear running stream that is not contaminated is all right. Ponds usually become foul and stagnant, and very unfit for cows to drink from.



MAIN ROAD, PORT SHEPSTONE.

(See Article on "Mechanically Propelled Vehicles as Feeders to the N.G.R.")
Blocks by Courtesy of "S.A. Railway Magazine."

Waste Wood and Its Utilisation.

SOME NOTES ON WOOD DISTILLATION.

WHAT MIGHT BE DONE WITH OUR WATTLE WOOD.

IN our issue of December, 1907 (pages 1,532-1,537), we published two articles on the question of the utilisation of some portion of the large quantities of wattle wood which are practically wasted every year on our plantations for the distilling therefrom of methyl alcohol, acetates, acetone, turpentine, wood oil, oxalic acid, etc. One of these articles was from the pen of Lt.-Col. Leuchars, and excited much interest at the time. Though interest has waned somewhat, the possibilities before us in the distilling of wattle wood are still with us, and consequently every contribution to our knowledge of what can be done with all this waste wood is welcome. Such a contribution—and one that is particularly valuable, coming from an authoritative source—we have before us in the form of an interesting article on the “Utilisation of Waste Wood” in the last number, just to hand, of the *Bulletin* of the Imperial Institute, London, which has been prepared with a view to affording general information in reply to inquiries that are from time to time received at the Institute as to the possibility of utilising waste wood. We accordingly reproduce herewith the useful information contained in the article, which we think will be read with interest by all persons concerned in the growing of wattle bark.

It is stated, at the outset, that, apart from its use for structural purposes, there are two main ways in which wood can be utilised at present, viz., in the manufacture of wood pulp for paper-making, and by destructive distillation for the production of wood spirit, Stockholm tar and wood charcoal. For these purposes the cheaper woods are available, and for destructive distillation especially the waste products of the various timber industries are suitable.

Much of the wood refuse generally available, such as shavings, saw-duct, chips, spent dye and tan woods, etc., is at present used as fuel, its value for this purpose being a few shillings per ton. In considering the disposal of such material it is important to ascertain whether local conditions will permit of the disposal of the products of distillation at a higher rate than would be obtained for the raw material as fuel. Indeed, in undeveloped communities where wood spirit, tar and charcoal are not saleable in large quantities, the destructive distillation of wood refuse is not likely to be remunerative or even feasible.

From air-dried wood about one-third of its weight of charcoal can

as a rule be obtained, this having an average value of from 17s to 22s. per ton in districts where coal is not readily obtainable. Thus, from one ton of air-dried wood refuse, containing from 20 to 25 per cent. of water, and consequently worth from 4s. to 5s., the value of the charcoal would be about 6s. In most countries there is little difficulty in disposing of the charcoal, as its uses are numerous. Besides being largely employed in the manufacture of iron and steel and in the extraction of other metals, such as copper and tin, it can be used in sugar refineries for filtration and for various domestic purposes. Special uses for the "small" charcoal obtained by distilling wood refuse are found in the manufacture of certain kinds of "smokeless" fuels, calcium carbide, and for packing cold storage chambers.

Wood refuse can be carbonised more rapidly and at a lower final temperature than blocks of wood, a temperature of only 300 degs. C. being adequate. One result of this is that the pyroligneous acid obtained in the distillate is of good quality, and fairly readily purified to yield acetic acid. Wood refuse is also more readily dried by exposure to the air, and does not require to be stored for a year or two before its content of water is reduced to from 20 to 25 per cent., which gives the best results as is the case with blocks of freshly-cut wood.

DESTRUCTIVE DISTILLATION OF WOOD.

In the destructive distillation of wood the blocks or refuse are heated in a suitable vessel provided with a small aperture fitted with a pipe. In modern practice the carbonising vessel is generally a cylindrical wrought-iron retort built into brick-work in a horizontal position. The retorts are of an average size of 3 metres long by 1 metre in diameter, and are made to hold anything up to about 4 tons of wood (a quarter of a "cord"). They are generally set up in "batteries" of two, and heated by the same fire from below. The naked flame is not allowed to impinge directly on the iron retorts, which are heated only by the hot furnace gases, this result being obtained by utilising iron or brick shields or arches. Before the application of heat all the orifices and connections are plugged with clay. The batteries of retorts are set up in rows, and the exit of each retort is connected with a worm condenser made of copper, and cooled externally by means of running water.

When the wood to be distilled is sawdust or scraps of very small size, such as spent tanning materials, dye woods, etc., it is generally advisable to have the plant arranged in a special manner owing to the necessity of having the wood quite dry. This result is frequently obtained by building the retorts in such a manner that the hot gases from the one distillation are used to dry the wood refuse ready packed in another retort. The retorts are also sometimes made on a rotary system to facilitate even drying, and thus prevent unequal carbonisation.

A special form of kiln is said to be adopted on many of the large wood-distillation plants in Sweden, capable of treating wood in all conditions—sodden forest timbers, saw-mill waste and ordinary air-dried logs. The general arrangement of the furnace is in the form of a long tunnel through which pass open steel cars, on which the wood is vertically stacked. The cars are taken through the furnace at an average rate of 22 per diem for perfectly wet wood, and about 36 per diem for air-dried timber. Uncondensed gases from the distillation are returned to the furnace and burnt, thus practically dispensing with the addition of any further fuel.

On the application of heat to the retort the substance of the wood is charred with the formation of volatile products, which are driven off. Those which are condensable are liquefied again in the condensers, and collected in suitable receivers.

PRODUCTS OF DISTILLATION.

Although the process of distillation is practically identical whatever the kind of wood employed, the products obtained are different according to whether “hard” or “soft” wood is used.

Products from Hard Wood.—Most of the wood distilled is hard, such as beech, birch, maple, etc., and is practically free from resinous constituents. Four chief products are obtained, viz.: (1) An inflammable gas, which escapes from the condenser, and should, if possible, be returned to the fire to aid in heating the retorts; (2) A watery liquid known as “pyroligneous acid”; (3) Wood tar which is condensed with the pyroligneous acid; and (4) Charcoal, which remains behind in the retorts.

The tar itself may be used as fuel to create the heat necessary for distillation, and in this case it is sprayed with a jet of steam and used in a similar manner to “oil fuel.” In this manner the use of coal as fuel may be avoided completely.

The charcoal is allowed to cool for a day or two, either before removal or in specially-devised “cooling chambers” out of contact with the air, or else it is drenched with water immediately after extraction from the retorts, to prevent its spontaneous combustion in the air and consequent loss.

Purification of the Products.—The tar and the reddish-brown pyroligneous acid are run off together into large settling vats, where separation is effected by the tar collecting at the bottom. Each is then distilled separately. As the tar and the pyroligneous acid are to a certain extent mutually soluble, the residue from the latter contains a quantity of tar, and the distillate from the former is distinctly acid in character. If the tar is to be utilised as fuel the acid is removed by passing the acid tar downwards over “baffles,” where it is met by an upward current of steam or vapours from the stills, to which the pyroligneous acid is given

up. The chief products obtained by distilling the wood tar (which is itself an article of commerce) are light and heavy wood oils, wood creosote and the well-known product wood pitch, which is left behind in the stills.

In the most modern treatment of the pyroligneous acid an arrangement of plant known as the "three-still" system is adopted. In the first and largest still the crude acid is heated, whereby the volatile acetic acid and "wood spirit" are driven off, and most of the dissolved tar is left behind. The outlet pipe carries the vapours into the second still, and passes them through a thin cream of lime and water. This absorbs the acetic acid with the production of calcium acetate, but does not affect the wood spirit, which passes on and is treated afresh in the third still in order to remove the last traces of acetic acid. In this manner the distillate eventually obtained is free from acid, and by suitable rectification can be made to yield pure methyl alcohol, commercial wood spirit and wood naphtha. The thin paste of calcium acetate remaining in the stills is run out and concentrated in large iron pans until it contains about 84 per cent. of "acetate of lime." This is the product which comes on the market as "grey acetate of lime."

Application of the Products.—The uses of charcoal have been enumerated above. Most of the acetate of lime is subjected to dry distillation, and is thus converted into acetone and calcium carbonate (chalk). The increasing consumption of acetone in chemical industries has rendered this process one of considerable importance. Besides being a useful solvent for varnish resins, acetone is largely used in the manufacture of smokeless explosives and celluloid articles, and its use will very probably be greatly extended in the near future. The present price of acetone is about £60 per ton, and it takes about 40 tons of wood to produce one ton of acetone. The by-products in the distillation, the so-called "acetone oils," are also useful as "paint removers." Their formation is due to the presence in the pyroligneous acid of organic acids higher than acetic acid. Pure acetic acid is also prepared from the acetate of lime by distilling it with sulphuric acid.

Wood alcohol is used very largely for technical purposes. It is a useful solvent, and is widely applied for producing formaldehyde, for "denaturing" ordinary alcohol, and in the coal-tar dye industry.

Products from Soft Wood.

When "soft" woods, *i.e.*, resinous woods, such as those obtained from the various pines, are destructively distilled, the substances obtained are as follows:—(1) Inflammable gas; (2) light oils; (3) pyroligneous acid; (4) tar; (5) charcoal. The pyroligneous acid so manufactured is inferior in quality to that afforded by hard woods. The principal fraction is the "light oil," which is usually collected in two portions, of which

the lower boiling one is a kind of crude turpentine oil. This is a dark red oil of unpleasant odour, but after suitable treatment and fractionation it yields a nearly colourless spirit of characteristic odour, which is used as a substitute for ordinary turpentine oil. Compare this *Bulletin*, 1906, 4. 215.) The best yields of products in this process are obtained from the heart wood.

STEAM DISTILLATION OF WOOD.

Besides the method of destructive distillation described above, a process of distillation with steam is gradually finding extended use for obtaining valuable products from waste pine wood. This process only occasions the separation of volatile products (turpentine oil) already pre-existent in the wood.

Pine-tree stumps, saw-mill waste, and sometimes pine timber itself, are cut into chips and placed in a vertical retort fitted with a steam injection pipe. Through this pipe saturated or superheated steam is blown in, and turpentine oil, which is readily volatilised, passes out of the retort and collects with the water in a receiver, where it may be readily separated.

The residual wood, after drying a short time in the air, is suitable for fuel. The crude turpentine is rectified from a copper still, and yields a slightly yellow spirit of an agreeable odour which is readily saleable at a price slightly below that of ordinary turpentine oil.

ELECTRICAL PROCESS FOR THE DISTILLATION OF WOOD.

It is stated that a new electric process has been evolved recently in British Columbia for the utilisation of waste wood, and that the process combines destructive distillation with a primary distillation of the free turpentine oil contained in the wood. An experimental plant has been set up at Vancouver, B.C., where waste fir wood is obtainable from local saw-mills, and the electricity from water-power at a low cost.

The wood is filled into oblong cans constructed to fit into special retorts, the brickwork of which is permeated with wrought-iron strips, through which passes a current of 110 volts. The temperature of the vessel, as measured by direct-reading pyrometers, rises from 75 degs. C. at the start to 130 degs. C., when turpentine oil begins to volatilise. The current is then shut off, radiation from the brickwork sufficing to complete the distillation. By the time the temperature of the can has risen to 150 degs. C. on the outside and 205 degs. in the interior, the turpentine oil has been nearly all removed. It is collected by condensation with cold water as in the ordinary process. The rosin contained in the wood melts and runs down to the bottom of the vessel and out through perforations, and is collected in the bottom of the retort.

The can containing the wood is now removed from the turpentine oil

retort into an adjoining still, where the heating is continued and the wood residuum is destructively distilled as previously described. In this way the fresh set of products, charcoal, wood-tar, etc., is obtained quite separate from the turpentine oil and rosin of the first distillation.

It is stated that by this process the following yields are obtained per 1,000 lb. of wood from British Columbia coast fir:—

Turpentine Oil	...	...	...	6.7 galls.
Rosin	...	...	...	168.0 lb.
Tar Oil	...	...	...	5.1 galls.
Tar	...	...	...	68.0 lb.
Charcoal	...	...	...	323.0 galls.

The charcoal obtained is said to be of good quality, tough, and suitable for special purposes.

WHERE DISTILLATION IS CARRIED ON.

Owing to the absence of cheap supplies of raw material, wood distillation is not widely practised in the United Kingdom, but the distillation of sawdust, scrap-wood, spent tan and similar materials is carried on to a small extent.

In many of the Colonies and Dependencies large tracts of forest exist frequently containing trees of little value as timber, and these might well be used in this way, where the products of distillation, and especially the charcoal, are marketable locally. In Canada wood distillation is greatly on the increase owing to developments in the consumption of charcoal.

In Natal attention has been directed recently to the possibility of using wattle timber for destructive distillation after the valuable tanning bark has been removed.* At present this timber is used for pit props and in other ways, but the demand for it is said to be much below the supply.

Wood distillation has been undertaken recently in Victoria, Australia, and a large works has been opened near Warburton, drawing its supplies from the forests of Gippsland.

In India also there would appear to be a possibility of extending this industry. Owing to the religious prejudices of the natives it is necessary to use only wood charcoal in the refining of sugar intended for native consumption. This and the common practice of covering "go-downs" with tar-impregnated felt opens out in India a market for two of the chief products of wood distillation.

* See article in the December, 1907, issue of the *Agricultural Journal*, referred to at the beginning of the present article.—ED., *N.A.J.*

The Study of Poultry Foods.

THEIR COMPOSITION AND RELATIVE VALUES.

VERY few poultry keepers undertake the study of the feeding values and compounds of the various poultry foods. These persons omit one of the most, if not the most, important element to successful feeding. Ignorance of the feeding values of poultry foods, we are told by Mr. W. Powell Owen, writing in the *Rural Californian*, is nearly always the cause of scarcity of eggs; and in order to put poultry keepers on the right track he discusses the various food compounds, and the proportions in which they should be used in order to obtain the best results.

The food compounds, Mr. Owen reminds us, are five in number:—

Water.—A considerable amount of water is to be found in all food-stuffs, no matter how dry they may seem. Grains and dried meat contain on an average about 10 per cent. of water, raw meats 50 per cent., while some vegetables contain 90 per cent.

Protein.—The term nitrogenous matter and the albuminoids are sometimes used to designate this compound. The protein of food contains nitrogen, and its purpose is to build up and repair the working organs and parts of the body, and to supply material for the production of eggs, feathers, etc. No other food compound can do this.

Fats and Carbohydrates.—These two compounds may be grouped together, since they serve nearly the same purpose. Carbohydrates are heat-producing and fat-forming, and constitute a large part of vegetable foods.

Ash.—The ash of the food is the source of the mineral matter of the animal body, and as such is of importance. Ordinary feeding stuffs, however, do not contain sufficient lime for shell formation, and an extra supply of this material is required.

To obtain the best results in egg-production from confined laying or breeding stock, some form of animal food should be supplied every day. The term animal food denotes a number of highly nitrogenous substances fed to poultry. The most important are waste meat, ground raw bones, fresh fish, and skim milk. A large amount of animal food is necessary during the moulting time, for the growing feathers require the nitrogenous matter that meat supplies.

Waste Meat.—This may consist of meat scraps, livers, etc., and can be fed either raw or boiled. The water used to boil the meat in should be fed in the mash.

Ground Raw Bones.—The bones should be finely ground up, so that

the fowls can eat them. These, then, form a nutritive food that is relished.

Fresh Fish.—For breeding fowls it would be satisfactory, but for pullets producing eggs for table, fish is apt to flavour the eggs.

Skim Milk.—This has very high feeding values for fowls. In the rearing and fattening of chickens its value cannot be overestimated. In fact no satisfactory substitute has as yet been discovered in the crate-fattening of chickens. Skim milk should be used to mix with the mash for laying hens.

It is preferable to feed a number of grains rather than to limit the selection to one sort. Poultry will thrive better on a variety of food-stuffs than they will on a single food of the same nutritive value. An ideal feeding grain is wheat and oats mixed together. On cold days maize can be included, but left out on warm days. Oats is the most perfect grain, containing 14 per cent. water, 13.17 albuminoids, 7.03 fat, 66.97 carbohydrates. Heavy oats should be obtained, as well as of a good quality. Inferior oats contain about 20 per cent of husk and fibre, which has no feeding qualities. In the morning, during the cold months, after the warm mash, each fowl should receive a handful of the smaller grains, *i.e.*, buckwheat, rye, etc. These small grains, well distributed in the litter, will compel exercise and so fill the egg basket.

Water.—Plenty of water is indispensable to the health of the stock. Laying hens require an abundant supply of fresh water on account of the great percentage of water in eggs.

Brown Eggs.—Refuse (shell, 10.9; water, 64.8; protein, 11.9; fat, 11.2; ash, .7

White Eggs.—Refuse (shell, 10.7; water, 65.6; protein, 11.8; fat, 10.8; carbohydrates, nil; ash, .6.

If we analyse brown eggs, we find that they contain on an average 64 per cent, and white eggs, 65 per cent. Seeing that the egg contains such a large amount of water, it is very necessary that hens should only have access to clean and fresh water. Laying hens should be wired off from stagnant water, ditches, etc., if the eggs are to be sold for table use. I once read that twelve eggs contain approximately one pint of water.

Lime.—Laying hens must have lime for the formation of egg shells. A single hen per annum produces approximately over 2 lbs. of lime. How can a hen obtain all the lime necessary for her eggs. Oyster shell (ground) is cheap enough (2 lbs. for 1½d.), and must be given.

Grit.—Poultry masticate their food by a grinding process in the gizzard. The more hard and insoluble the grit is, the longer it will perform its function. Flint grit is very cheap, 2 lbs., 1½d., and different sizes are manufactured, both for poultry and chickens.

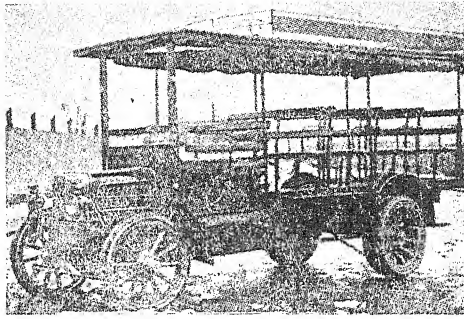


FIG. I.

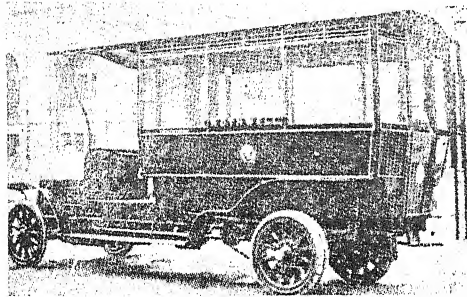


FIG. II.

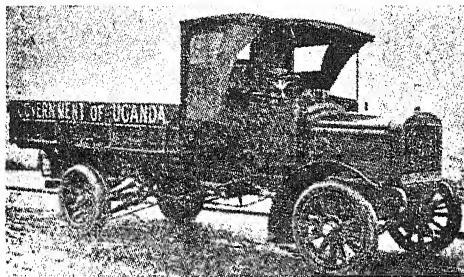


FIG. III.

TYPES OF MECHANICALLY PROPELLED VEHICLES.

Fig. I. : A nineteen-seated 16-h.p. Albion combination passenger and goods carrying vehicle for Colonial use. The seats are removable. Fig. II. : The single-decked Maudslay 'bus owned by the Midland Railway, and running between Rothwell and Desborough. Fig. III. : A handsome lorry supplied by Commercial Cars, Ltd., through the Crown Agents, to the Government of Uganda.

(See Article on "Mechanically Propelled Vehicles as Feeders to the N.G.R.")

Blocks by Courtesy of "S.A. Railway Magazine."

Green Foods.—Vegetable foods such as clover is a very valuable one. clover hay should be cut into small lengths with a chaff-cutter and placed into sacks. A handful to three adults is enough. Place the required quantity in a bowl, and pour over it boiling water; after soaking eight hours or so, mix in the mash. In each 1,000 lbs. of clover there are nearly 30 lbs. of lime, hence it becomes an essential part of the ration given to fowls.

Cabbages and other green foods are necessary at midday. The yolks of eggs laid by hens that have little access to green stuffs are always very pale. Hence green stuffs are necessary to tone the yolks to that bright yellow which is so characteristic of the new laid egg.

Don't forget that there is more profit in coaxing a horse than in kicking him, and try gentleness and see how it goes.

In buying a cow avoid the one with a restless disposition. There is a difference between high nervous development and restlessness.

Have patience with the calf. Don't expect him to know how to drink when he is only a day old. You certainly knew less at this age.

Water being lighter than milk, the specific gravity of milk is lowered by addition of water. Therefore, it is easily possible by removing cream from normal milk to increase the specific gravity, and then, by adding water, to decrease the specific gravity again to that of normal milk. The addition of sugar, salt or any similar substance to milk increases the specific gravity. Since water has been the most common adulterant of milk, it was formerly thought that such adulteration could readily be detected by ascertaining the specific gravity, but the results of using the specific gravity may be very misleading, when considered without reference to any other factor.—*Lucius L. Von Slyke* ("*Modern Methods of Testing Milk and Milk Products.*")

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

By W. C. MITCHELL, *Government Apiarist, Central Experiment Farm, Cedara.*

Who shall deny that in a country which annually imports over 14,000 lbs. of honey, which possesses no winter worthy of the name and where foul brood is unknown, there are vast possibilities in the yet unexploited fields of apiculture? Such a country is Natal!

It is now proposed to initiate a series of periodical notes on bee-keeping, hoping that they may be of some assistance to the many who have a few hives, and also the means of interesting a still larger number in the subject. By this means it is hoped the South African public may shortly be relieved of the necessity of satisfying their craving for sweet things with imported honey.

Bee-keepers in South Africa are waking up to the fact that if they wish to compete in the open market with their produce, they will have to go to work on up-to-date lines. The old packing-case which has done duty for so many years must be discarded in favour of a movable frame hive, with a view to the production of honey in a neat, clean and marketable condition. With these movable frames the state of the hive and its inmates can be ascertained at any time; swarms can be partially controlled; fresh colonies be made from selected stocks, and last but not least, when removing the honey there is not that wholesale killing of bees which can hardly be avoided otherwise. There are many other advantages attaching to up-to-date methods which we cannot discuss at present. These will quickly become apparent to all converts to modern practice. There is another means, however, of improving the commercial possibilities of bee culture, which must come into play with the use of modern appliances; this is co-operation among bee-keepers. With this end in view a Natal Bee-Keepers' Association has been formed, with the object of furthering the interests of apiarists in the Colony: Rule 2 of the Association reads:—"The aims and objects of the Association shall be the encouragement, improvement and advancement of bee-culture in and throughout Natal; to educate and bring together bee-keepers and work for the humane and scientific treatment of the honey bee; to supply South African markets with honey produced in Natal."

The subscription to the Association is only 2s. 6d. per annum, it being hoped that by keeping the figure so low every Natalian who owns a hive of bees will become a member. The first direct advantage that

members will reap is a special *members' discount* of 12½ per cent. on all bee goods purchased from certain firms in Natal, whilst a firm in the Transvaal offers as much as 30 per cent. on some lines. Other reasons why all who own "a bee" should join are that the present demand for their produce can by co-operation be improved and enlarged; beginners in apiculture can obtain free advice and assistance; by comparing notes in these columns improved methods will obtain which mean bigger yields and larger profits.

The writer hopes that all bee-keepers will communicate with him as early as possible, enclosing a remittance for their annual subscription.

ANNUAL MEETING OF THE ASSOCIATION.

The second annual general meeting of the Natal Bee-Keepers' Association was held in Maritzburg, in a room kindly placed at their disposal by the Education Department, on Friday, June 18th, at 10 a.m. The item on the agenda was the election of officers. Miss Ritchie was unanimously elected President, and Mr. W. C. Mitchell (Cedara), Hon. Secretary and Treasurer. Owing to the attendance being rather disappointing it was agreed to elect a committee of five (three to be a quorum), to remain in office for six months, when it was hoped that the members' roll would be considerably augmented. The following committee was then elected:—Mrs. Mitchell (Cedara); Messrs. J. A. J. Auld (Donnybrook); H. E. Carter (Howick); W. Fuller (Maritzburg); J. W. Gavin (Camperdown); W. L. Stead (New Leeds); the President and Secretary being members *ex officio*. A sub-committee, consisting of Miss Ritchie, Mr. Fuller and the Secretary was appointed to deal with the matter of affiliation with the South African Bee-Keepers' Association.

In order to induce as many members as possible to join the Association the subscription was allowed to remain at 2s. 6d., exclusive of the official organ. The *S.A. Poultry Journal* and the *Natal Agricultural Journal* were chosen as the official organs of the Association; the combined circulation of the two being already a large one, this arrangement should obviate any additional expense on the part of many members.

After considerable discussion it was decided not to appoint any depot for the sale of members' honey, but that a minimum scale of prices be drawn up, and that members shall not be permitted to offer their honey below the Association's price. It was pointed out during the discussion that some members might put up their honey in a much cleaner and neater condition than others, and that this honey would find a ready sale at prices above the minimum scale, thereby helping to educate careless members, but that in addition, the Association should

use every endeavour to improve the general production and "get-up" of its members' supplies.

On the question of the use of a uniform package and label, it was decided to adopt the label of the S.A.B.K.A. if we became affiliated, but that members would have the option of using their own private label in addition if they so desire.

The Secretary intimated that he would be extremely glad if all members would drop him a line occasionally, in order that a bee-keepers' calendar could be tabulated, giving the source of honey in different districts and times of honey flow, with any other matters of general interest.

A vote of thanks was tendered unanimously to Mr. Bennett for very kindly placing the room at the disposal of the Association, the Secretary being instructed to write him to that effect. With a vote of thanks to the Chairman the meeting terminated.

Apiculture.

NOTES FOR BEGINNERS.

By W. C. MITCHELL, Government Apiarist.

THE following lines are penned in the hope that the information afforded may be of some assistance to beginners and to those who are adopting modern practice.

In districts provided with an early spring flow swarming may be looked for in September. I have had a swarm out in August, but this is exceptionally early and would only occur in the case of a colony that had come through the winter in a strong condition. To take full advantage of these swarms and to obtain the honey they produce in a clean, neat and marketable form, readers must understand that it is essential to hive the bees in what is called a movable frame hive; the advantages these possess over the ordinary box are manifold. The only way one can obtain honey from the latter is by cutting out the combs and straining them in a piece of muslin. The honey thus produced is not a saleable article; it is more or less mixed with pollen, or bee-bread, as it is commonly termed, and a large portion of it comes from cells in which larvae have previously been reared, which means that the honey will be dark and of an undesirable flavour, but even worse than this it will often

occur that a certain number of larvae that were in the cells at the time the comb was removed from the box will be crushed and mixed with the material to be strained! It will be patent to all that such methods as these must greatly detract from the marketable (?) value of the article produced; one is loth to call it honey. Now, a movable frame hive obviates working under any of these disadvantages; with it honey of "fancy" quality can be produced in two distinct forms, either comb or extracted, the article will be clean and wholesome and will not be obtained at the cost of the lives of many of the industrious workers who have collected the stores, as would be the case when working under the old-fashioned methods.

Comb honey is produced in small wooden frames or boxes, called sections, capable of holding about 14 ozs. of honey. Each can be removed independently of the others (though in actual practice this is rarely done), without killing bees, and will contain neither pollen no brood. The production of honey in this form is more suitable than the extracted for the man with only one or two hives, as the latter entails a greater expense in obtaining an extracting machine, etc. The various operations to be performed in the production of each will be dealt with on some future occasion; for the moment I wish to deal with hiving the spring swarms and have been digressing. Have your frame hive ready for your swarm before the swarm is ready for the hive; with the latter in readiness you can afford to wait for the bees—the bees will not wait for you!

There are two types of hives in use in Natal; the English double walled hive with non-reversable, open-end frames, and Root's Danzenbaker hive, with single walls and reversable closed end frames. The former is fast going out of use in favour of the equally good and far cheaper Danzenbaker. A crate containing five of these, in the flat, costs 65s. in Maritzburg, members of the Natal Bee-Keepers' Association obtaining them considerably cheaper. Hives in the flat are put up in crates; all parts fit accurately, a hammer being the only tool required to put them together; full directions for fitting them up being contained in each crate. To these directions there are two exceptions which should be observed; do not nail the small entrance bar to the floor board, and instead of inserting narrow strips of foundation comb in the brood frames whole sheets should be used. These will not be supplied with the hives, and must therefore be purchased separately. Obtain "medium brood" foundation, allowing rather more than a pound for each hive; this will cost 5s. 9d. per pound or less to members of the N.B.K.A., but the outlay will be an economical one. Each pound of wax secreted by the bees is obtained at the expense of 12 pounds or more of honey; the value of this at 6d. per pound would therefore more than exceed the cost of the comb foundation, but additional advantage is gained by means of the

great saving of time. A strong swarm, hived with full sheets of foundation will often have several of the frames drawn out and full of eggs in 48 hours, which means that a strong force of bees will be available from this hive very much sooner than could be expected where they had to build all their comb for the production of brood. The full sheets should be wired into the frames. The *modus operandi* is as follows:—Bore five small holes along the centre of the top and bottom bars of the frames, the two end holes being 1 inch from the ends, the others being equidistant from these and from each other; do this before the frames are nailed together. When the holes are bored, nail the frames and insert the rivets in the end bars. For wiring, No. 30 wire is used; cut off a piece $2\frac{3}{4}$ times as long as the frames, run this through the holes backwards and forwards across the frame so as to have five perpendicular wires, leave slightly slack and secure the ends by means of small tacks. To avoid bending the bottom bar when wiring and thus obtaining a frame which is convex on the lower side, insert a piece of wood in the centre of the frame, between top and bottom bars and of the exact length of the end bars, removing same when the operation is completed. Having fixed the foundation in the frames (instructions for which will accompany the hives), wires must be embedded in the wax. This is best accomplished with the aid of a small implement called a spur wire embedder, which is simply a small grooved wheel mounted on a handle and is used hot. By running the wheel along the wires the wax is melted and the foundation securely fastened. To support the foundation while wiring a small board must be used, just small enough to fit inside the frame and of exactly half the thickness of the end bars. A very little practice will show just how hot to have the wheel and how much pressure to apply so as not to drive the wire right through the wax and yet fasten it sufficiently, the object being to get the wire as near the centre, or mid-rib, as possible. The choice of a hive-stand depends largely upon the locality of the apiary; in some places it will be highly important to have this ant-proof, which can be attained by standing the legs in small dishes containing water; a bandage of cotton wool round the legs has also been recommended for the same purpose. Never place the hive on the ground. It is highly important to make sure that the two sides of the hive are dead level, otherwise the combs will not hang perpendicularly in the frames; if it be tilted slightly from back to front no harm will be done, as it will help to keep out driving rains, but under no circumstances should the opposite be the case. See that the hive is always preserved from the weather by an efficient coat of paint, white for preference. A certain amount of shade is required, especially in the middle of the day, but too much shade is conducive to dampness in the hive, whilst the morning sun shining in at the entrance appears to stimulate the bees to early trips afield.

Very often a tendency on the part of any colony to swarm may be detected by the bees loafing and clustering at the entrance for a day or two previously, but this is not always seen, nor is it an infallible sign of swarming; in very hot weather it may be noticed in strong colonies, when greater ventilation should be at once provided, or more abundant shade.

It is seldom that a swarm issues and leaves at once for some pre-chosen site; as a rule, after issuing and flying around for a few minutes the bees cluster. Where only small bushes exist in proximity to the apiary little trouble will be experienced in hiving the swarm, but, if the bees cluster on a high tree one will probably resolve then and there to work on the "clipped queen" method ever after—of this more anon. For controlling a swarm in the air a spray pump will be found most useful, causing the bees to cluster quickly, whilst if they be seen to be making for some undesirable spot they can be headed off by directing the spray in that direction.

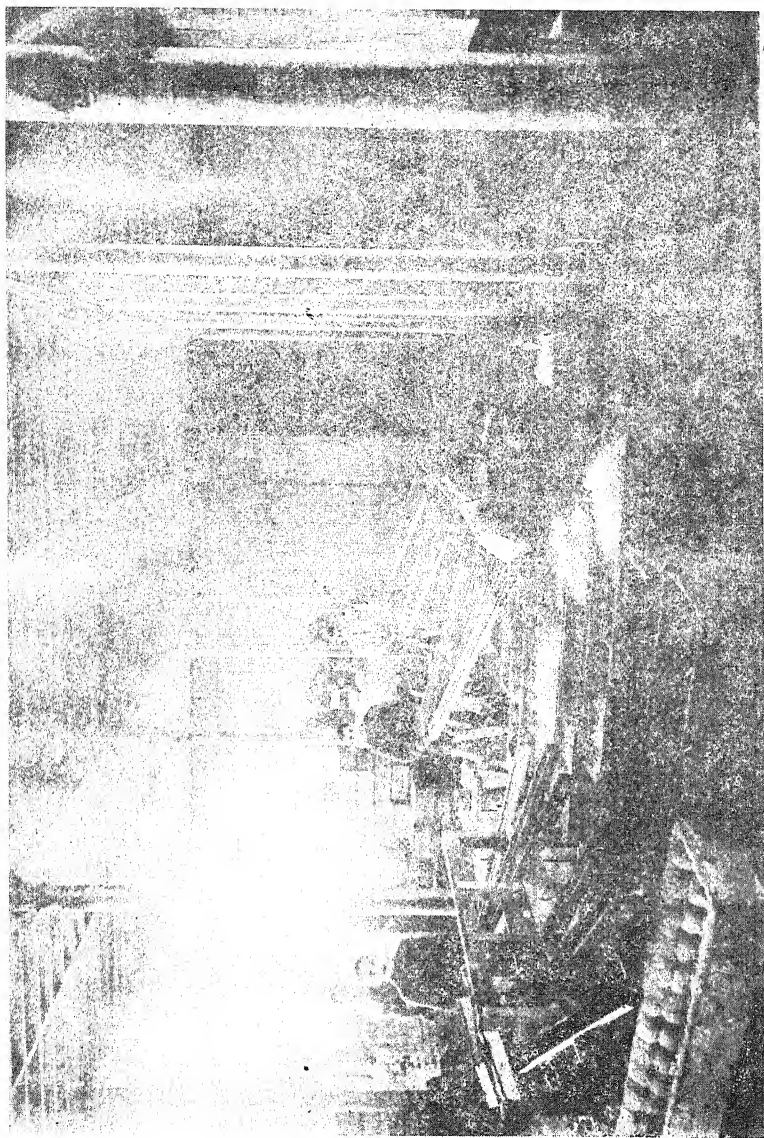
Manum's swarm catcher is a handy tool to assist in hiving swarms clustered some height from the ground. This consists of a basket or cage made of wire cloth, in the shape of an inverted pyramid, hinged on the end of a long handle enabling it to swing freely in a vertical position. The cage when in use is passed over a clustered swarm from underneath, a horizontal movement then brushes the swarm off its resting place, catching the falling bees inside the wire cloth cage, the lid of which is then quickly shut down. The cage is now left in the vicinity for a few minutes, when the remainder of the swarm will quickly cluster on the outside. A little ingenuity will make a very good substitute for the "Manum's" with the aid of a bag and a wire hoop; the swarm catcher is fitted with a tripod to permit of poising the long handle in the air while the bees are clustering round the cage; this addition can be made in the case of the home-made article also. The hive having been prepared, the swarm should be hived as soon as possible; place a flat board, sloping from the ground to the hive entrance in front of the hive, and shake the bees on to this with a sharp jerk; a joyful hum will be set up, and amidst much fanning of wings the army of workers will immediately take possession of their new quarters. A careful watch should be kept for the queen to make sure that she has entered, for unless she be present the swarm will abscond. Should the bees have clustered on a bush and be easily accessible without the aid of a long handled contrivance, place a box or skep immediately underneath the swarm and give the branch to which they cling a sharp jerk, dropping them into the receptacle placed in readiness for them; turn this on its side and wait a few moments while the bees in the air join those in the box, then hive as stated above. When clustered on the trunk of a tree or some similar situation they may be brushed into a box with the aid of a fowl's wing or a proper bee brush. It is seldom that trouble is experienced through the bees of a

swarm being vicious, as they are usually gorged with honey, in which condition they seldom sting. Where one can have access to a frame of brood from another hive an excellent plan is to insert a frame containing brood in all stages; no trouble will be experienced through the bees absconding where this is practised. Failing a frame of brood, fix a piece of queen excluder zinc over hive entrance; this effectually cages the queen, without whom the bees will not leave. Should there happen to be a dearth of nectar a little judicious feeding may be resorted to with advantage. A few hours after the bees have been hived, quietly lift the cover to observe how many frames they are covering, now contract the hive to just that number of frames by inserting the division board next to the bees. The last-named device is a plain board, supplied with each hive, of the same size as the brood frames, and it is used to conserve the warmth of the cluster by giving them a smaller area to keep warm. Later on as the colony increases in number the division board may be moved, giving the bees more room, but in this operation be guided by the rule that the bees should be allowed no more frames than they can properly cover.

Swarming is the natural method of increase; in modern apiculture it is possible, and may be desirable, either to discourage this increase or to adopt artificial methods as a means of augmenting same. These practices will be described later.

Charcoal is a great aid to good digestion among a flock of poultry. Keep a little constantly with them.

The Agricultural News (Barbados), in a recent issue, contains a valuable article on Lima beans. In Mauritius, Lima beans are cultivated on a large scale, and turned into the soil as a green manure. The plant is one which contains a cyonogenetic glucoside, i.e., a chemical compound which, under certain conditions, is capable of yielding prussic acid. These plants are, therefore, dangerous as a stock food, and many cases have been reported from Mauritius and other countries of animals having been poisoned as the result of eating the green vegetation. Fatal results to stock, too, have not infrequently followed the consumption of raw seed (beans) in Mauritius and Java. The beans on analysis have been shown to contain varying quantities of prussic acid.



EXPORT OF CITRUS FRUITS.—I.

The Naartie Graders at the Government Fruit Packing House, Durban.
(See "*Traffics and Discoveries.*")

Industrial Alcohol and Fibre from Leaves and Stems of Plants.

By THOMAS BARRACLOUGH.

[The following article, which was originally contributed to the *British Trade Journal*, has been sent to us by a correspondent as likely to prove of interest to many readers of the *Agricultural Journal*.—Ed.]

DURING the last fifty years an amazing amount of skill and enterprise has been devoted to the utilisation of what our forefathers called "refuse," or "waste," resulting from mining, industrial, and other processes. They do not seem to have cared much for any results except obtaining or manufacturing the special articles they had in view. The so-called "waste" was considered valueless, and in many cases proved to be a serious nuisance.

Times have changed; the term "waste" as formerly understood is now largely considered to be the offspring of ignorance. Intelligence, technical and commercial, has come to the rescue, and the by-products (formerly called "waste") accruing from an enormous number and variety of mining and manufacturing processes are now made the source of great and ever-increasing profit. In some cases the by-products are of more value than the articles originally produced. In other cases the value of the by-products not only pays the cost of the original process, but leaves considerable profit. In many other cases the knowledge that valuable by-products can be obtained from raw material, not considered worth treating under former conditions, has resulted in the establishment of an immense number of new and profitable undertakings. It would be an easy matter to instance some of the most striking of these cases, but space forbids.

NEW TREATMENT OF LEAVES AND STEMS.

The subject of the present article is to point out that, by means of greatly improved and novel methods of treating the leaves and stems of certain classes of plants, not only can their fibres be extracted, but their juices can be utilised for the production of industrial alcohol. In other words, two valuable articles of commerce can be produced from the same raw materials. I refer to many varieties of the Agave (aloe) family, and also of the closely-allied families of Foureroya and Maguey, likewise of the Sansevieria family. There are other plants the leaves and stems of which contain equally valuable fibres and juices. Our knowledge of them is daily increasing.

Many of the above plants are at present utilised solely for the production of their fibre. Some of them are utilised on a very large scale in Mexico, mainly for the production of a kind of beer, called Pulque; others are utilised for the production of a kind of brandy, called Mescal, or Mexical. The so-called "Pulque Maguey," which bears leaves up to 200 lbs. weight each, is the plant mostly used for the purpose of producing pulque, but many other varieties of the Agave family are also utilised, such as the Agaves: *Americana*, *Scolymus*, *Prostrata*, *Potatorum*, etc. Some descriptions of Agave are specially utilised for the production of "mescal"—I mention *Aurea* and *Fequilana*. The pulque is not only produced in enormous quantities for drinking, but is also used for distilling purposes.

Analysis of the juice of the Pulque Maguey is reported as showing as follows:—9.553 sugar, 0.540 gums, 0.726 salts, 89.181 water, etc.

Instead of entering into a full account of the methods current in Mexico of obtaining the juices from the plants above mentioned, I limit myself to pointing out that these juices, whether obtained from the stems or the leaves, contain a large amount of sugar in varying quantities, thus rendering them very suitable for the distillation of alcohol.

THE PRINCIPAL VARIETIES.

Botanists affirm that there are 185 varieties of the Agave family, and of these about fifty varieties are well known. There are about fifteen varieties of the Fourcroya, and twelve varieties of the Sansevieria growing in most tropical, semi-tropical, and other countries. It is not possible in an article of this description to give particulars of the relative values for manufacturing purposes of the many varieties of these plants. The value of their juices for distilling purposes depends not only on the nature of the plants, but also on the nature of the soil, the climate, the range of temperature, the elevation of the place of growth, etc. The value of their fibres is well known or easily ascertained.

A few remarks respecting the growth of these plants may be interesting. (1) In some countries the plants I have mentioned and some others are now largely and successfully cultivated, solely for the valuable fibres they contain. Their cultivation and the extraction of their fibres is becoming an ever-increasing and profitable business. (2) In some countries certain of these plants are cultivated mainly because of their valuable protective nature. Thus, in India the Agave *Americana* and *Vivipara* are used to form impenetrable fences for the protection of railways and of enclosures generally, and for preventing the travelling or transference of sand and surface soil by the hot winds. The leaves of these plants can be cut from time to time and utilised for the production of fibre and industrial alcohol. (3) In other countries, one of which I instance, viz., the Mauritius, the *Fourcroya Gigantea* grows wild on

barren shores and on land where nothing else will grow. It is not cultivated but simply harvested. The crops of leaves are cut and gathered whenever it suits the convenience of the owners or buyers of the leaves, who have factories for the extraction of the fibre; the juice is not utilised at present. (4) In India, Africa, Mexico, Australia, and other parts of the world some of these plants, for instance, the Agaves and Foureroyas, grow wild in arid desert wastes, where scarcely any other plants can grow. They cover immense areas of rocky ground and grow at various elevations, say, from the plain up to 7,000 feet above the sea.

RECENT DEVELOPMENTS.

The plants growing on these wastes have generally been considered practically valueless for various reasons: Ignorance of the very valuable nature of the leaves and how best to treat them; the cost of harvesting, transporting, and treating the leaves; questions of labour, transport, water supply, etc.—all these, but principally ignorance, have discouraged enterprises which, to be thoroughly successful, should be on an important scale.

At the present time, in consequence of the ascertained fact that these leaves possess a double value (for fibre and alcohol), much attention is being drawn to the exploitation of these large areas of plant-covered land. Concessions and monopolies are being obtained with the view of realising the immense profits resulting from the obtaining of two very valuable products from the same raw materials. These profits justify the use of improved methods of transporting the leaves with great economy to central works by the use of special trucks or wagons running on roads or light rails, and hauled by tractors driven by alcohol.

In most countries alcohol is usually placed in bond under varying conditions, and when intended to be used for motive power, fuel, light, or manufacturing purposes it undergoes a denaturing process, which renders it unfit for drinking. This process consists essentially in adding to the alcohol a substance soluble therein of a really bad taste or odour or both, and of an intensity which renders it impossible to use the mixture as a drink.

The denaturing material mainly used is Methyl alcohol; there are many other materials (about thirty) which are equally effective. It is customary to add to 100 parts, by volume, of alcohol (not less than 90 per cent. strength) ten parts of approved methyl (wood alcohol) and one-half of one part of approved benzine. This blend or mixture is classed by leading governments as completely denatured alcohol.

Industrial alcohol is now being increasingly used with great efficiency and economy in many parts. The leaves and stems grow in country districts, the industrial alcohol is produced there, and is consequently very cheap. All kinds of engines, stationary, portable, for motors, for

road and water transport, etc., can be driven by it. It is used for many industrial purposes; also for agriculture, such as for ploughing, harvesting, mowing, pumping water, sawing timber, grinding grain, etc. Industrial alcohol, 40 deg. Cartier, can be used for all driving purposes.

Industrial alcohol is also being increasingly used for heating purposes; it burns with a blue flame, intensely hot and without smoke. Its odour is not disagreeable, rather the contrary; and consequently it is well adapted for heating houses and premises of all kinds, for cooking, coffee roasting, etc. Many important improvements have, as a consequence, been recently made in the construction of heating apparatus, cooking and other stoves, by adapting them for burning alcohol in a thoroughly practical and economical manner.

For illumination alcohol is also proving itself very valuable and safe; the large and increasing demand for its special lamps has brought into the market many very practical improvements.

ALCOHOL FOR MOTIVE POWER.

The following notes concerning the application of industrial alcohol for motive purposes may be interesting, this being the most important of its present uses. Alcohol produced at 7d. to 9d. a gallon is a most valuable source of power, especially in distant country districts, where other fuels are obtainable only at much higher prices. Alcohol is *far less dangerous* than gasoline, and there is a marked advantage in its use, seeing that higher compression pressure may be used without pre-ignition, this tends to increase the efficiency of the engine; the expansion of alcohol, however, not being so great as that of mineral spirit, power is slightly affected. Alcohol engines are nearly all of vertical construction, and can be run equally well with gasoline. Alcohol works as well as gasoline in a gasoline engine with slight modification of the carburettor, as alcohol does not carburet so easily "at starting" as gasoline. This latter becomes volatile at a temperature of blood heat (98.5 degs. F.), but a much greater degree of heat (158 degs. to 176 degs.) is necessary to volatilise alcohol rapidly enough for motor purposes.

Carburettors made to burn alcohol are furnished with a simple heating apparatus, using the exhaust of the engine to supply sufficient heat to the vaporising chamber to suit alcohol. Alcohol of 40 degs. Cartier is well adapted for alcohol engines. One pint per hour per horse-power is stated to be the average consumption of alcohol. The same remark applies to gasoline, not exceeding 88 degs. nor less than 62 degs. of gravity. Engines for alcohol fuel are usually constructed with a single cylinder up to 20 h.p.; with two cylinders up to 40 h.p.; above 40 h.p. triple cylinders are used.

In cases where a variety of fuels may be expected, the carburettors are so made that they work equally well with alcohol, petrol, or kerosene

by arranging for different degrees of heat in the vapourising chamber to suit the different fuels. Important improvements have recently been made in this direction in order to produce engines capable of working well and economically with a variety of fuels.

ALCOHOL PRODUCTION PROCESS.

A few remarks respecting the processes of producing alcohol from the juices of the leaves and stems and the extraction of their fibres may be interesting. To produce alcohol the leaves and stems are first passed through a special crushing and juice-extracting machine, which performs three operations. It slits the leaves into longitudinal strips, the smaller ones being slit up the centre, while the larger ones are slit into four strips. In passing through its three pairs of large brass rollers the leaves and stems are not only crushed with great pressure, but the upper and lower skins are simultaneously scraped by a special arrangement, so as to facilitate the flow of juice and the subsequent extraction of the fibres. The juice, after being prepared, is then distilled: Special continuous-working steam stills are used for distilling the alcohol in one operation in a simple and economical manner with a minimum of fuel and water. These stills are simple in construction, easy to erect, and capable of being worked by an ordinary intelligent mechanic. They exhaust entirely all the spirit from the wash, and produce alcohol of the highest commercial strength. They are constructed of many sizes—small, medium, and large—up to the production of several hundred gallons of pure alcohol per hour. With each still are supplied full details and instructions for working the process. The cost of producing the alcohol is very small. It is, of course, governed by various matters, such as the quality of the juices, the cost of fuel, labour, etc., and the size of the installation; the larger it is, the smaller the cost of producing alcohol.

NEW FIBRE PRODUCTION PROCESSES.

The crushed leaves, strips of leaves and stems from which the juices have been extracted are soaked, thoroughly washed by special machines, and freed as far as possible at this stage from non-fibrous matters, such as pith, bits of skin, etc. They are then placed in vertical kiers or boilers, specially constructed for treating their contents in the most efficacious and gentle manner, in order to soften and remove the gums, loosen the remaining non-fibrous matters, and to free and clean the fibres. This is effected partly by boiling them in hot water with very weak chemical liquors under high steam pressure. Whilst still in the kiers, the fibres, after boiling, are thoroughly washed with hot and cold water. The liquors, likewise the hot and cold water, are caused to circulate *continuously* through the fibres in the kiers. It is by reason of the high pressure used in boiling and of the constant circulation, that the

chemical liquors used are of the weakest, so as not to damage the fibres, either as regards their strength, colour, or ductility.

After removal from the kiers, the fibres are again specially washed; then dried in the open air or in a special fibre-drying apparatus, so constructed that it dries large quantities of fibre quickly, not so much by great heat as by copious currents of dry air so as not to affect the quality of the fibres.

In some cases they undergo a brushing operation before packing into bales. This brightens the fibres and materially increases their selling value.

The effect of treating the crushed leaves, strips of leaves, and stems, from which the juice has been previously extracted by this process, is threefold:—

- (1) It extracts from them very economically the full amount of fibres which they contain.
- (2) The fibres extracted are strong, bright, clean, ductile, and of good colour and quality.
- (3) Special attention is called to the fact that there is no appreciable loss or waste of fibre by this process.

A complaint frequently heard in connection with the working of most of the modern, powerful, quick-running, fibre-scutching machines is the serious loss of good fibre resulting from the system and the immense speed of their scutching process. This loss varies from ten to twenty per cent.—in some cases even more.

The saving of fibre by the new process more than pays for the cost of extraction in most cases. In other cases, after allowing for the increased quantity of fibre produced, the cost of extraction is brought down to quite a nominal figure. Stress is again laid on the fact that the raw materials used in this process are a by-product of the alcohol process.

Complete installations of the machinery and plant for treating the crushed leaves, the strips of leaves and the stems, and for producing the fibre ready for market can be obtained, together with full particulars of the process.

SIZE OF INSTALLATIONS.

I do not advise the installation of combined alcohol and fibre-producing works on a very small scale, because economy of production must be considered. Medium and large-sized installations work much more economically than those of small size, as regards fuel, power, chemicals, labour supervision, etc.; the larger the works the cheaper the cost of producing alcohol and fibres. The quantity of leaves and stems at disposal or obtainable in a given time and the amount of capital involved are leading factors in deciding on the size of the installation. It is a simple matter so to arrange the installation for both processes that it can be easily increased in the future.

In districts where the leaves and stems are available, growers and landowners can advantageously combine to form a company or to sell and deliver their leaves and stems to central works for treatment.

In considering the size of the proposed installation, persons interested in the matter should bear in mind that the machinery and plant used for the two combined operations can also be separately utilised. Thus, in the case of certain leaves and stems containing plenty of juice suitable for distilling and no fibre worth extracting, the first part of the installation can be used, as also for ordinary distillation from grain, etc. There are also certain leaves and stems that contain very valuable fibres, but little or no juice suitable for distilling. In this case, the second part of the installation can be utilised. The matter is simple, and there is no occasion for any risk being run. Information can be obtained respecting the value of the juices for distilling purposes and the value of the fibres. The best method is to prepare samples of the juice, expressed from the leaves or stems, and then to obtain an expert analysis of them in order to prove their suitability or otherwise for the economical production of industrial alcohol.

Care should be taken that the juices do not come in contact with iron. They are often very acrid and liable to be affected by contact with iron. If the samples have to be sent some distance for analysis it would be better to put them in glass bottles.

As regards the fibres, it is an easy matter to obtain samples by hand labour and to submit them to experts for valuation; the quality of the fibres and their prices can thus be ascertained. The percentage of fibres in the leaves and stems is also a very important matter. It varies exceedingly, and can only be ascertained by carefully weighing the quantity of raw material treated and by afterwards weighing the dry fibre extracted so as to ascertain the percentage.

Several important installations are now under consideration, and it is hoped that these remarks will be of widespread interest and usefulness.

A horse that is a fast walker is more valuable to the farmer than a fast trotter.

Don't dock your horse's tail. He needs it in winter as well as summer, and it was put there by a master hand.

Division of Agriculture and Forestry.

MONTHLY REPORT FOR JUNE.

SCHOOL OF AGRICULTURE AND FORESTRY.

THE results of the Sessional Examination held at the beginning of last month have proved exceptionally encouraging to all members of the teaching staff, the standard maintained in the papers submitted being remarkably high. The following eighteen papers reflect the ground covered by lecture courses during the preceding session:—

ELEMENTARY SUBJECTS.

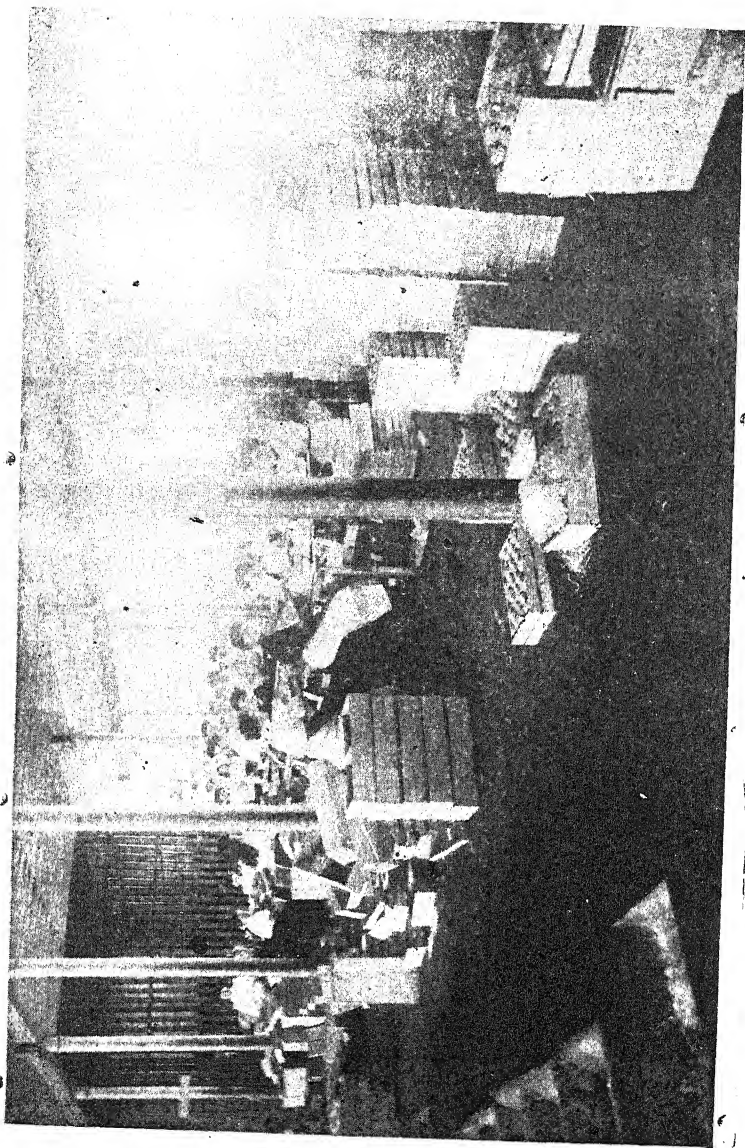
FIRST YEAR: SESSION 2.—SESSIONAL EXAMINATION, JUNE, 1909.

STAPLE CROPS.

- 1.—How would you proceed to establish a pedigree strain of maize?
- 2.—What distances of planting would you adopt for maize in the midlands and on the coast of Natal respectively? Give reasons for your decision.
- 3.—By what considerations would you be guided when deciding upon:—(a) the size of sets; (b) distance of planting; and (c) manuring of the potato crop?
4. Estimate the importance of spraying as a method of prevention of disease in the case of the potato crop. How would you prepare Bordeaux mixture in normal strength?
- 5.—At what stage of growth would you harvest a maize crop for the preparation of silage? Give reasons for your decision.
- 6.—Describe suitable rotations of crops for a system of mixed farming in the midlands of Natal.
- 7.—What measures would you take to improve the fertility of poor or exhausted lands?
- 8.—Give some account of the place of Soy bean and Cow pea in Natal agriculture. Describe approved methods of cultivation for these crops.

THE STUDY OF BREEDS.

- 1.—Account for the presence of red, white and roan beasts in more or less definite proportions in a given herd of Shorthorns.
- 2.—What do you understand by "line-breeding"? Describe the principles involved.
- 3.—The sheep-breeders of Great Britain have sought improvement in carcase. By what methods has this object been attained, and to what extent would you recommend their adoption in Natal in the event of an export trade in mutton and lamb being successfully established?



EXPORT OF CITRUS FRUITS.—II.

View showing the Packers at Work.
(See "*Traffics and Discoveries.*")

4.—How would you proceed to examine and value a growing fleece of wool?

5.—Assign causes to the following faults in wool:—(a) Excessive grease; (b) unsoundness; (c) harshness; (d) kemp; (e) hair.

6.—Compare and contrast the Rambouillet and American Merinos.

7.—Describe the conformation to be sought when breeding:—(a) Heavy horses for draught purposes; (b) Artillery horses to meet military requirements; (c) Sugar-mules for employment on the Natal coast.

8.—The establishment of a bacon-factory in Natal opens a profitable market for bacon pigs. Discuss the question of the selection of suitable breeding-stock.

DAIRY PRACTICE.

1.—What course would you adopt when the after-birth is retained after calving? 15

2.—Give the period of gestation of as many domestic animals as you can. 15

3.—How would you treat cow

(a) During pregnancy? 5

(b) At the time of parturition? 5

(c) When the fœtus is in three different unnatural positions? 6

4.—What is the Babcock Test, and how is it used? 8

5.—How must cream be handled and kept in order to make the most and best butter? 10

6.—Give a detailed account of how butter is made, giving a list of temperatures used in preparation of utensils. 20

VETERINARY SCIENCE.

1.—Name two medicinal agents (medicines) acting as cathartics (purgatives), and their doses, for the horse and ox. 5

2.—What are the symptoms of Strangles? Give a detailed description of the treatment of an acute case. 14

3.—What do you understand by Nagana? What domesticated animals are commonly affected? Detail the symptoms and treatment. 10

4.—What are the differences between Spasmodic Colic and Flatulent Colic? Detail the symptoms and treatment of each in the horse. 18

5.—If a medium-sized horse is in perfect state of health, not being exercised, what will be his temperature, the number of beats of pulse per minute, and the number of breaths taken per minute 10

6.—State what you know of Biliary Fever in the horse, its cause and treatment. 14

7.—Give the names of three medicinal agents used for reducing fever in animals, and their doses for horses, oxen and dogs. 10

8.—What are the symptoms of Glanders in the horse? What animals are susceptible to its attacks, and what portions of the horse's body are attacked? What is the difference between the micro-organism

of this disease and that of Suppurative Lymphangitis, and what methods are employed to enable you to ascertain if the patient is affected by Glanders or by Suppurative Lymphangitis? If either disease is proved to exist what course would you pursue in connection with it? 18

ELEMENTARY AGRICULTURAL CHEMISTRY

1.—What is meant by the “boiling point” and “freezing point” of a liquid? Why, in the determination of the former, must the atmospheric pressure be taken into account?

2.—Into what number of degrees are the Fahrenheit and Centigrade scales of temperature divided? What is taken as the zero for each scale? What fraction of a degree Centigrade is a degree Fahrenheit? Turn 15 deg. C. into deg. F. Turn 19 deg. F. into deg. C.

3.—Define “Specific Gravity.” What is meant by “Density” and how may it be expressed? What is meant by saying the specific gravity of milk (at 15 deg. C.) is 1.036? Given that 4.6 cubic feet of soil weigh 761 lbs. 14 ozs. what is the specific gravity of soil?

4.—Describe fully two experiments by which the composition of water has been established. What are the properties of water?

5.—What is meant by saying a water is “hard”? Distinguish between “temporary” and “permanent” hardness. Describe two methods by which the temporary hardness of a water may be removed.

6.—Give definitions of the following:—(1) Atom; (2) Molecule; (3) Element; (4) Compound; (5) Basic Oxides; (6) Acidic Oxides. Give examples of 3, 4, 5, and 6.

7.—Calculate the simplest possible formula for Nitrate of Soda, given the following data:—

One short ton of pure nitrate contains—

541.19 lbs. of sodium.
329.42 lbs. of nitrogen.
1,129.39 lbs of oxygen.

Short Ton—equals—2,000 lbs.

	Symbol.	Atomic Weight.
Sodium	Na	23
Nitrogen	N	14
Oxygen	O	16

8.—If you leave your plough and other implements made of iron or steel out in the open for any length of time, what happens? Explain the phenomenon. What is the chief agent causing the change that takes place? What do you know about the composition of the substance formed? To what class of chemical bodies does it belong?

AGRICULTURAL BOTANY.

1.—Describe the chief points of difference between a monocotyledonous and a dicotyledonous plant. Name four crops composed of plants of each group respectively, some of which have been, and some of which are still, growing on the College Farm. 25

2.—Compare a seed of a monocot. with that of a dicot., *eg.*, the bean with the mealie. 25

3.—Beginning with the seed describe fully the botanical development of the mealie plant until seed is produced. Do the same in the case of the potato from "set" to seed. Why are potatoes not grown from seed? When is this method adopted? 35

4.—Make a sketch of a dicotyledonous stem. What is the importance of the vascular bundles? How do they differ from the vascular bundles in the monocot. stem? 30

5.—What is an annual, a biennial, a perennial and an ephemeral? Give examples. 25

6.—Name the specimens provided, and mention any botanical and agricultural facts known to you in connection with them. 30

7.—Make a sketch of a flower, and name the parts. What is the difference between the flowers of the pumpkin or cucumber and those of the Cape gooseberry or the potato? 25

8.—Explain clearly why when repeatedly mown a grass plot gets thicker at the bottom. What happens if the grass is allowed to seed? 25

AGRICULTURAL BOTANY (PHYSIOLOGY).

1.—Describe a growing plant cell and state the work performed by the different parts of the cell. Where are the growing regions in plants? 20

2.—What are the chemical elements essential to a growing plant? How could you prove by experiment that these are required by a plant? 20

3.—What are the proximate constituents of plants? Name several plants which are especially rich in any one of these constituents. 20

4.—How is the green colour of the plants connected with, say, the corn in the mealie ear, and the potato tuber? Is it an advantage to have crops with a good leaf surface? If so, why? Discuss the influence of too heavy dressings of nitrogenous manures in this connection, and mention any plants which are devoid of green foliage. 40

5.—What are the functions of (a) the roots, (b) the stem, and (c) the leaves of a plant. 20

6.—Describe the root system of (a) maize, (b) lucerne, (c) the potato. What is the practical importance of the differences in root structure? 25

7.—What points would you attend to in order to secure the maximum and uniform germination of your seeds in (a) a heavy stiff soil,

(b) a damp vlei? What influence would a rainy season be likely to have on next year's seed? 35

8.—You wish to buy lucerne seed, paspalum seed, and "seed" potatoes. What considerations would influence you in making your choice? The following information is given by your seedsman:—

	Paspalum Seed.			Lucerne.		
	A	B	C	X	Y	Z
Germination ...	90 %	85 %	70 %	95 %	80 %	90 %
Purity ...	70 „	90 „	80 „	85 „	95 „	80 „
Price ...	1s. 4d.	1s. 6d.	1s. 2d.	1s. 4d.	1s. 2d.	1s. 3d.

Assuming that 1s. 4d. is a fair price for sample A, and 1s. 4d. for sample X, which of the samples of paspalum and lucerne are really the cheapest? Would you ask for further information in connection with the seed?

FORESTRY.

1.—How would you proceed, if instructed, to lay out a tree plantation? 14

2.—What do you know about seed sowing? 9

3.—In choosing a site for a Nursery what factors would you consider? State your reasons. 9

4.—Describe the method of making a loam stack, and say what materials are used in conjunction with it in preparing composts employed in Nursery operations. 9

5.—Name the various kind of Wattles you know, and briefly state their economic values. 9

6.—What is a cutting? Describe the types of cuttings commonly employed in propagation. 9

7.—What methods of propagation of plants, other than by seeds and cuttings, are there? 9

8.—Write a short essay upon any subject connected with Forestry not covered by preceding questions (excluding Eucalypts).

HORTICULTURE.

1.—Why is the operation of Grafting or Budding necessary in the propagation of fruit trees?

2.—Describe the method of tongue or whip grafting.

3.—Give the general treatment recommended for young trees on planting out permanently.

4.—In what way is the balance between the root and superficial growth of a tree affected by pruning?

5.—Give arguments for and against the use of seedling and budded citrus trees; also mention stocks commonly used.

6.—What manures are to be recommended for citrus trees, and their effects?

7.—Describe the symptoms of "Mal di Goma," its causes, and remedial treatment.

8.—Give the more important scales infesting citrus trees, and any particulars you know about them (treatment not required).

APICULTURE.

1.—Describe the South African Honey Bee as completely as possible. 15

2.—How would you transfer a colony from an ordinary box to a standard frame hive? 12

3.—What are the essentials of a standard frame hive? Describe the Danzenbaker. 10

4.—Give briefly spring, summer, autumn and winter treatment in the Apiary. 15

5.—What is (1) Extracted, (2) Run, and (3) Comb Honey? Compare the advantages and disadvantages in the production of each. 15

6.—A colony is queenless. On September 1st a fertile queen is introduced. On what date may we expect to find capped worker cells from the introduced queen? How would you introduce? 8

7.—Define (1) prime swarm, (2) after swarm, (3) drone, (4) drone trap, (5) virgin queen, (6) laying worker. What do you know of each? 15

8.—Discuss the advantages of bee-keeping from a farmer's point of view.

BOOKKEEPING.

(Three questions to be attempted, including the last.)

1.—What does the balance of the Cash Account represent, and how may its accuracy be tested in real business? 20

2.—What is a "Trial Balance" and of what use is it? 20

3.—Supposing the stock in hand is over-valued at the end of one year's trading, what effect will it have on the next year's accounts? 30

4.—Post the following entries, made in the Rough Book, into the Ledger, and close the Accounts at the end of the quarter's trading, drawing out a Balance Sheet:—

1908.	£
March 1—Began business with cash.	1,500
„ 1—Bought Cattle from A. Brown, worth	300
„ 1—Bought Hay, Corn, etc., from C. Davies, worth.	250
„ 1—Bought Implements from E. Fairhurst, worth	140
„ 26—Sold Hay to A. Brown.	165
April 10—Sold Cattle for Cash.	100
„ 21—Bought Wheat Seed from C. Davies.	10
June 9—Paid A. Brown.	250
„ 30—Paid for Rent	230
„ 30—Paid for Wages	160
„ 30—Valuation of Cattle.	300
„ 30 „ Implements.	120
„ 30 „ Hay and Corn in Stock.	175
	130

MENSURATION AND LAND SURVEYING.

1.—Find the area in acres, etc., of a rectangular field, whose length is 10.52 ch. and breadth 7.63 ch. ? 40

2.—In measuring a field of four straight boundaries, its diagonal is ascertained to be 475 lks., and the perpendiculars upon the diagonal from the opposite corners 360 and 225 lks. respectively. Required, the area of the field in acres, etc. 40

3.—The surface of a circular reservoir is an acre; what is the radius of the circle in yards? 40

4.—What is the area of a circular plot of land whose diameter is 3 chains? Give the answer in acres, roods and perches. 40

5.—A rectangular tank contains 294.25 c. ft.; its length is 9.75 ft. and breadth 6 ft. Find its depth. 30

6.—On the plan given, draw in pencil the lines it would be necessary to run to enable you to make a complete survey with the chain and cross-staff. How would you set about to find its area? 50

7.—Draw a plan and find the area of a field from the following entry in a field book:—

	to E	
	240	40 to F
To D 50	200	
	120	80 to C
	90	20 to B
	From A	

50

8.—How would you lay out a field in the form of a rectangular of 10 acres in area, with one side three times as long as the other? 50

TROPICAL AGRICULTURE.

1.—How would you propose to exploit the new market for starch-producing crops opened by the establishment of a starch-factory at the Umgeni?

2.—An effort is being made by local manufacturers to meet the internal demand for vegetable oils and soaps, and co-operation on the part of the agricultural community is desired. What recommendations could you offer in this connection to coast and midland farmers respectively?

3.—Extensive plantations of *Agave* and *Fourcroyia* have been established on the Natal coast with varying results. To what precautions would you attribute the success attending the efforts of certain planters? Endeavour to find reasons for some marked failures.

4.—Pineapples have been successfully exported to the London markets, and an extension of the area planted with this crop is to be expected. Describe approved methods of propagation and cultivation.

5.—What is the source of Manila Hemp? How would you prepare the raw product for shipment?

6.—Species of Hemp ("*Sangu*") are indigenous to South Africa. Describe a suitable system of cultivation for this crop grown (a) for seed, (b) for fibre.

7.—Discuss the prospects for profitable cotton cultivation in Natal.

8.—Give an account of the commercial products derivable from Cassava.

FARM MECHANICS.

1.—Define the power-units employed in descriptive mechanics.

2.—How would you ascertain the practically available power developed by (a) water-wheels; (b) rams; and (c) turbines?

3.—What precautions should be observed in the employment of leather-belted for the transmission of power?

4.—Account for the fact that the exposure of milch-cows and fat stock to cold rains leads to a loss of milk and live weight respectively.

5.—Discuss the place of the windmill in South African agriculture.

6.—Describe the relative advantages of the walking and sulky ploughs.

7.—How would you proceed to re-set a worn plough-share?

8.—Compare the average working costs per H.P. of steam and oil-engines.

AGRICULTURAL BACTERIOLOGY.

1.—How do bacteria increase in numbers? What external influences affect the rate of increase? Knowing these facts how would you treat milk before sending it long distances to a creamery or consuming centre? 30

2.—What precautions ought to be observed in connection with the dairy and milch cows to ensure against bacterial infection of the milk? 30

3.—Give the average composition of cow's milk and state which of the ingredients are attacked by bacteria. 35

4.—Describe the work of the lactic-acid bacteria. What is their optimum temperature? What is the value of the work performed by these organisms? 35

5.—What is a "starter"? Under what circumstances is it advisable to use "starters" for cream ripening? What is a pure culture "starter," and how does it influence the butter? 20

6.—What organisms may induce rancidity in butter? Compare them with the lactic-acid bacteria as regards (a) reproduction, (b) work, (c) mode of life. 30

7.—Explain the following:—"Absolute sterilisation," "intermittent sterilisation," "pasteurisation," "disinfectant," "antiseptic." 20

8.—What work is performed by enzymes? Name one vegetable enzyme, three animal enzymes, and the two enzymes in milk. 20

ECONOMIC ENTOMOLOGY.

1.—Sketch and name the mouthparts of a cockroach. How does the structure of the mouthparts of insects and insect larvae, which damage crops, affect the mode of controlling the pests? 30

2.—Give a short account of the life histories and distribution of the red and brown locusts. What are the best methods of treating these insects to prevent injury to crops? 30

3.—Describe in some detail the pests which attack growing mealies. Give notes in connection with their extermination and the prevention of their attacks. 35

4.—What do you know about the fruit fly? Name the plant it attacks, and describe the methods you might adopt to prevent its ravages. 20

5.—Write a concise description of the insects of the order *Coleoptera*, which attack stored grain, e.g., mealies, Kafir corn, beans. How would you deal with these pests? 35

6.—Enter fully into the economic importance of the Natal codling moth and the true codling moth. State how you would prevent their attacks. 25

7.—State all you know concerning the lucerne caterpillar. 25

8.—Sketch and describe the structure of a typical insect, e.g., the common cockroach. 25

ADVANCED AGRICULTURAL CHEMISTRY.

1.—What is meant by "weathering" of rocks and stones? Name the agents that induce weathering and explain their action.

2.—Which three elements of plant food are of most importance from the point of view of manuring? Indicate the approximate quantity of each that is removed from an acre of land by the growth of an average crop of wheat, swedes, barley, and clover.

3.—Give examples of various waste materials from manufacturing processes which are employed as fertilizers, stating their composition and character.

4.—What are the conditions of soil and climate which should be considered before deciding whether to use superphosphate or basic slag as a phosphatic manure?

5.—Compare the effects of nitrate of soda as a nitrogenous manure



EXPORT OF CITRUS FRUITS.—III.

Stacks of Trays, packed with Naartjes, ready for lidding and binding together with hoop-iron.
(See "*Traffics and Discoveries.*")

with those of sulphate of ammonia, indicating the crop and soils for which one or the other is more suitable.

5.—What impurities might you expect to find—

(a) in ammonia sulphate?

(b) in nitrate of soda?

How would you detect the presence of the impurity in ammonium sulphate with the simple reagents possessed by any farmer? For what crops would you be justified in using impure nitrate, and why?

7.—Explain fully the reasons for applying some fertilizers at a different time of year to others. Give examples and instances.

8.—When buying consignments of (a) bone dust, (b) basic slag, what are the chief points to be taken into consideration?

VEGETABLE PATHOLOGY.

1.—Classify the species and varieties of the “rust” organism occurring as pests of staple crops in South Africa.

2.—To what characters do you ascribe the greater degree of resistance to rust infection offered by such a type of oats as the Algerian?

3.—Describe any peculiarities in the life-history of the “maize-smut” organism which lends additional gravity to the prevalence of this disease.

4.—Why are the methods of seed-treatment, successfully employed in the case of “smut” and “bunt,” inapplicable in the case of “rust”? Can you suggest alternative measures of prevention?

5.—Give an account of structures associated with the “resting” or winter stages in the life-history of fungoid cereal diseases.

6.—Describe any fungus in tropical climates responsible for the disease known as “sleeper-rot” in sawn timber.

PRIZE GIVING.

A prize giving was held on the 14th June, when His Excellency the Governor of Natal graciously presented the certificates and awards. The following report was submitted by the writer:—

On an occasion like the present, an opportunity occurs for the discussion of not more than one of the many aspects of the educational problem, for which we would desire to secure your consideration. Speaking at the birth of a new dominion within the British Empire, one would urge that among the forces which must go to make the South African nation really great, industrial education, or special training for vocations, is destined to play an all-important part. If ever there was a people and an age that needed the higher education, we are that people in South Africa, and we live in that age. I would therefore crave your indulgence for a brief review of our hopes and aims, the substance and projected machinery for equipping the rising generation of the agricul-

tural community with the weapons of commercial warfare. South Africa is already fighting to secure and maintain a foothold with the products of her soil on the markets of the world, and it would be suicidal to ignore the fact that compared with the opportunities afforded in Europe and America for acquiring knowledge and skill in our productive industries, the work now being done in South Africa is strikingly and painfully inadequate. Nor can it be said that we are without the means to give effect to our wishes in this respect if only we wish sufficiently strenuously—indeed, in these days we shall lack nothing to enable us to do anything, unless, indeed, it be the inspiration. Living in an agricultural community, with agricultural interests predominant, the case is one for active organisation justifying the financial support necessary to the conduct of our work. There is too little of what Matthew Arnold was wont to call the “geist” of education—a large outlook and understanding, a recognition of what is required from our university, and from our secondary and primary schools. Brested’s charge still unfortunately holds good even in South Africa, that “a public school is one which excludes all that could fit a man for standing behind a counter.” Culture is barren unless applied to forwarding the world’s work, and the problem before us is to obtain the universal recognition of the necessity of special education for every form of industrial life. We need a wider diffusion of industrial intelligence as a foundation for the highest technical success, and this can only be acquired in connection with the general system of education into which it should enter as an integral part from the beginning. “The latest philosophy of education reinforces the demands of productive industry by showing that that which fits a child best for his place in the world as a producer, tends to his own highest development physically, intellectually, and morally.”aldane, when fighting the battle of middle class education as a means of wresting from the Germans Britain’s lost supremacy in the manufacture of iron and steel, urged that courage, energy, and enterprise are in these modern days of little more avail against the weapons which science can put into the hands of our rivals in commerce than was the splendid fighting of the dervishes against the shrapnel and the Maxims at Omdurman. Modern agriculture lays under tribute every branch of pure science for the cheapening of cost of production. Without the assistance of applied science our agriculturists go unarmed to the battle of the markets with only a forlorn hope of success.

The kingdom of Prussia alone supports 259 schools of agriculture, attended by 10,000 pupile, and 1,000 other schools where instruction in agriculture is given. South Africa has at the moment two schools of agriculture, with a total accommodation for 100 students, while a third is to be opened at Potchefstroom within the next few months. The double aim of the German educational system—pure culture on the

one hand, and on the other the application of the highest knowledge to commercial enterprise—is a growing feature of German life, and is reflected even locally by the prosperity of our internal German settlements. The Germans grudge expenditure at least as much as we do, but expenditure on technical training experience has taught them not to grudge. In South Africa it is only gradually dawning upon the inhabitants that it is not all of farming to drudge, that intelligence and culture are needed on the farm, and that the proper exercise of these qualities will yield as abundant returns in the country as in the city; that boys may choose farming as a profession, and still be as good as anybody. Let me cite a concrete example from our own experience. Four senior students came to Cedara twelve months ago, without any previous experience of agriculture, from other callings and professions. During the past month two have received appointments as Superintendents of Land Settlement Schemes in Southern Rhodesia, a third has proceeded to Cape Colony to take entire charge at an early date of Messrs. Cooper and Nephews' Experimental Farm, while a fourth remains in Natal in a responsible and lucrative position. The qualifications required in every case were such as could only be attained under a system of technical education. I may be taken to task for the fact that of these four men only one remains in the colony where he received his training, but are we not now a united South Africa?

A word as to the machinery of education. At the present time the influence of the University in South Africa on secondary and primary schools is negligible. Between the primary and public schools there is no organic connecting link. Elementary education stands by itself. University education is isolated. The problem before us is to bring university influence to bear upon our secondary education, and to provide organic continuity between our primary and so-called public schools. We require such a system whereby every branch and every stage is linked to every other, and whereby, as soon as the student gets to the higher grades, the double end pure culture on the one hand, and on the other application of knowledge to industry, is carried out to great perfection. I have hitherto unsuccessfully urged the desirability of adopting a comprehensive system of scholarships from primary to public schools, and from the latter to schools of a tertiary type, such as our own, which should with the maturity of a general scheme of education, receive status as University teaching centres.

The special training of the scholar for his vocation in life should enter into his education as an integral part from the beginning, so that should he be called to the duties of life before completing a secondary school course, he will not go hopelessly handicapped throughout his career. To teach at first the few and then wait patiently for the seed

so scattered to spread from comparatively few centres is a method which does not commend itself to those who appreciate the vital necessity of hastened progress in agricultural development, and other channels of communication are being sought in Natal. In anticipation of a resolution passed at a recent Conference of the South African Agricultural Union, elementary classes in scientific agriculture are to be organised in the primary schools of the colony upon the basis of teachers' sessions at Cedara during the winter vacation, and an invitation to assist in the organisation of similar instruction in our public schools would be welcomed from those responsible for their management. Arrangements are further being made at the request of a number of professional farmers for the establishment of a correspondence school, and in the same connection a circulating library of agricultural literature, including periodical publications, will be set on foot.

As a medium of communication, however, the residential college has so many advantages that it has come to be regarded as an almost essential complement to the experiment station; and it is a striking fact that our own institution, originally organised as a supplementary feature to the work of a system of experiment farms in Natal, has, within three years from establishment, assumed a position of the first importance among our numerous undertakings. Such an alliance renders possible a scheme of instruction based, not upon empirical principles borrowed from other countries, but upon the results of experiments directed to the solution of local agricultural problems. The student can bring to his studies the advantages of personal observation, and the teacher is enabled to speak with the assurance derived from accumulated data and repeated confirmation of his facts. This is in fact the function of a university faculty—the bridging of the gap too frequently existing between the investigator and the practical farmer. To communicate his news in intelligible form to those by whom it is to be put to practical effect, is as much the duty of the investigator as the conduct of the experiments from which it has been derived, and frequently by no means the least difficult part of his task. It is not the function of the university to teach everything, but to teach something with the fullest authority and to defy criticism in its teaching; to teach in those faculties which it feels competent to undertake. In the work of building up a school of South African agriculture at our different stations we have now obtained a start of seven years on our students, and while the field of research has only been roughly broken, the fruits of further cultivation may be won by the combined efforts of teacher and student.

"The development of agricultural colleges will only, however, serve to bring out more clearly the fact that in the best conditions they can meet the educational requirements of only a small percentage of the agricultural community. If any reasonable body of the boys whose des-

tiny is farming, are to receive definite instruction in the principles of agriculture, it must be in schools of lower grade than the colleges. In this respect agriculture stands on just the same footing as any other branch of learning. And this is not a matter of interest and concern to the farmer alone. The enduring prosperity of our cities is inextricably bound up with the success of agriculture. Technical education has proved a sure road to commercial development and greatly increased wealth in connection with every industry which has received its benefits. It will prove equally so as regards agriculture. The productive results derivable from the work of our agricultural colleges and experiment stations may be multiplied an hundredfold by the education of thousands of our agricultural youth in primary and secondary schools in which there is to be definite and systematic teaching of the technique and scientific principles of agriculture."

His Excellency then distributed the prizes and certificates. A full list of the successes is appended. Upon completing the distribution His Excellency said:—

I do not as a rule officially visit on occasions like the present any one school in two successive years, but I look on the case of Cedara as exceptional, as this College is an adjunct—a most important adjunct—to that agricultural development of the Colony which enables it to maintain its health and continue its growth. It would probably be going too far to say that no country can grow except by its agriculture. The exploitation of its exhaustible mineral resources has, of course, a great effect on its development during the comparatively short period that it lasts, though it seems to me that when this period occurs early in a nation's life it represents a precocious childhood giving promises that may not afterwards be fulfilled. By commerce also nations grow quickly, though, if dependent entirely on this, they are not long-lived. Witness Venice and the United Provinces of the Netherlands. Development due to manufacturing industries is the development of the adult rather than the growth of the youth. That growth—the expansion into full manhood—takes place in the agricultural stage, just as the pastoral life belongs to the childhood, and the hunter's to the infancy of national existence. And by agriculture the youth of nations can be indefinitely extended. It is the elixir of national life, making nations long-lived. For over 2,000 years the people of the Pharaohs tilled the banks of the Nile. For more than thirty centuries the Chinese have cultivated the fields on which they still raise their crops of corn and rice. Rome only commenced to decay when, instead of producing its own food, it imported slave-grown corn from Sicily, Egypt, and Africa.

Some people think that the inauguration of food importation has meant for Great Britain what it did for Rome—the commencement of the end. Without subscribing to this theory, we can certainly affirm

that agriculture as a national pursuit tends to virility. It is natural that it should do so. Man is a fighting animal, gaining strength by his struggles. I do not refer exclusively or even mainly to struggles with other men, but rather to fights with the elemental forces of nature. The sailor and fisherman who have to contend with winds and waves, the engineer who controls the great forces of gravity and pressure, and equally the agriculturist who struggles with the earth and forces it to yield its fruit for his use, are essentially fighting men, and the nation that has a large proportion of them is one that need not fear for its future. The work of this College is to teach the youth of this Colony to struggle for mastery with the earth, and it is because I believe that this is well taught that it gives me so much pleasure to take part in these annual meetings.

I congratulate Mr. Sawyer on the extension of the school's work as evidenced by the report he has read to us, and the new prospectus that he is shortly to publish. I congratulate the students on having taken up a manly life which will strengthen the Colony, and I wish them all prosperity in that life.

His Lordship the Bishop proposed votes of thanks to the Governor and to Mr. Sawyer, and, respecting the former, he said that while the people of the Colony as a whole would rejoice that a Union of South Africa had been accomplished, yet it would regret one of its consequences, and that was their severance from one who had been so able and so splendid a representative of the King during the time he had been the Governor of the Colony.

This short speech was greeted with loud applause. Cheers were raised for His Excellency, and the proceedings terminated, the visitors leaving shortly afterwards to return to the City.

Following is the prize list:—

Elementary Subjects.

Study of Breeds: 1, J C Otto; 2, C H Lamb.

Staple Crops: 1, A P Jamieson; 2, C H Lamb.

Elementary Chemistry: 1, J C Otto; 2, W A Welshman.

Mensuration and Surveying: 1, N J Hays; 2, C H Lamb.

Farm Bookkeeping: 1, G H Simmons; 2, N J Hays.

Agricultural Botany: 1, T B Fletcher; 2, J C Otto.

Plant Physiology: 1, J C Otto; 2, A P Jamieson.

Forestry: 1, T B Fletcher; 2, J C Otto.

Apiculture: 1, F H Mason; 2, T B Fletcher.

Horticulture: 1, J C Otto; 2, A P Jamieson.

Dairy Theory: 1, J C Otto; 2, A P Jamieson.

Veterinary Science: 1, J C Otto; 2, W A Welshman.

Advanced Subjects.

Economic Entomology: 1, T B Fletcher; 2, J C Otto.
Agricultural Bacteriology: 1, J C Otto; 2, T B Fletcher.
Vegetable Pathology: 1, J C Otto; 2, W A Welshman.
Tropical Agriculture: 1, W A Welshman; 2, C H Lamb.
Farm Mechanics: 1, A P Jamieson; 2, C H Lamb.
Advanced Chemistry: 1, J C Otto; 2, A P Jamieson.

Special Prizes.

Farriery: F T Nicholson.
General Application: C J Glen.
Grand Aggregate: J C Otto.
Highest Aggregate obtained by Freshman: H G Whelan.

VACATION COURSE FOR SCHOOLMASTERS.

The month of July will be devoted to the purposes of a Vacation Course for Head and Assistant Masters from the Government Schools, of whom nineteen have entered their names for residence. Opportunity is to be found in this course for the establishment of a definite scheme of instruction in the elementary principles of scientific agriculture, as a permanent feature in the syllabus of the primary schools. Further particulars of this innovation will be provided in a later report; in the interim, however, it may be stated that it is hoped to establish small gardens, orchards and plantations for demonstration purposes in the immediate neighbourhood of the different school buildings.

APPOINTMENT OF A WOOL EXPERT.

The appointment of a demonstrator, Mr. T. T. McCall, to afford expert instruction in the management and breeding of wool sheep, shearing, wool-sorting and classing, etc., meets a long-felt want at our School for special training in this subject. Arrangements are also being made for demonstrations by Mr. McCall during the shearing seasons in all our wool districts, particulars of which can be obtained upon application to the writer.

THE ANALYTICAL LABORATORY.

The Chemist, Mr. W. R. S. Ladell, reports for May and June, that during these months several interesting investigations were undertaken, among the most important of which being the examination of tar obtained by distilling wattle wood. The wood of the wattle tree has long been a waste product, possessing very little market value. The wood, perhaps, is cut up and sold for fuel, pulped to form cellulose material for paper-making, or is burned either in such a way as to drive off the volatile matter, leaving a residue of wood charcoal, or completely, in order to obtain the ash, which being rich in potash, may be used as a

fertilizer. The profit from the production of wattle bark is usually so good that the utilisation of the wood as a bye-product is considered of little importance, but to the business man any proposition showing how the wood may be used in a really profitable manner must commend itself.

A certain firm has been experimenting in distilling wattle wood, and among the products of distillation a tar is obtained which should prove to be of good commercial value. A preliminary examination of the tar gave the following results.

A rough fractionation yielded per 100 c.c. tar.

Pitch—65 grms.

Aqueous liquid and yellow oil—distilling below 100 deg. c.—17 c.c.

Heavy yellow oil—distilling 110 deg. to 181 deg. — 10 c.c.

Orange coloured oil—distilling 181 deg. to 220 deg. —7c.c.

The oily products were further separated into 14 fractions. Some of these were found to be the same and were therefore mixed together.

The chief products were then; per 100 c.c. tar.

Boiling below 107 deg. c.

Light yellow oil—2 c.c.

Watery liquid—3.5 c.c.

Boiling 190 deg.—210 deg. c.

Orange coloured oil—9 c.c.

(Specific Gravity, 1.0482 15.5/15.5 deg.)

Boiling 210 deg. c.—230 deg. c.

Brown oil—8 c.c.

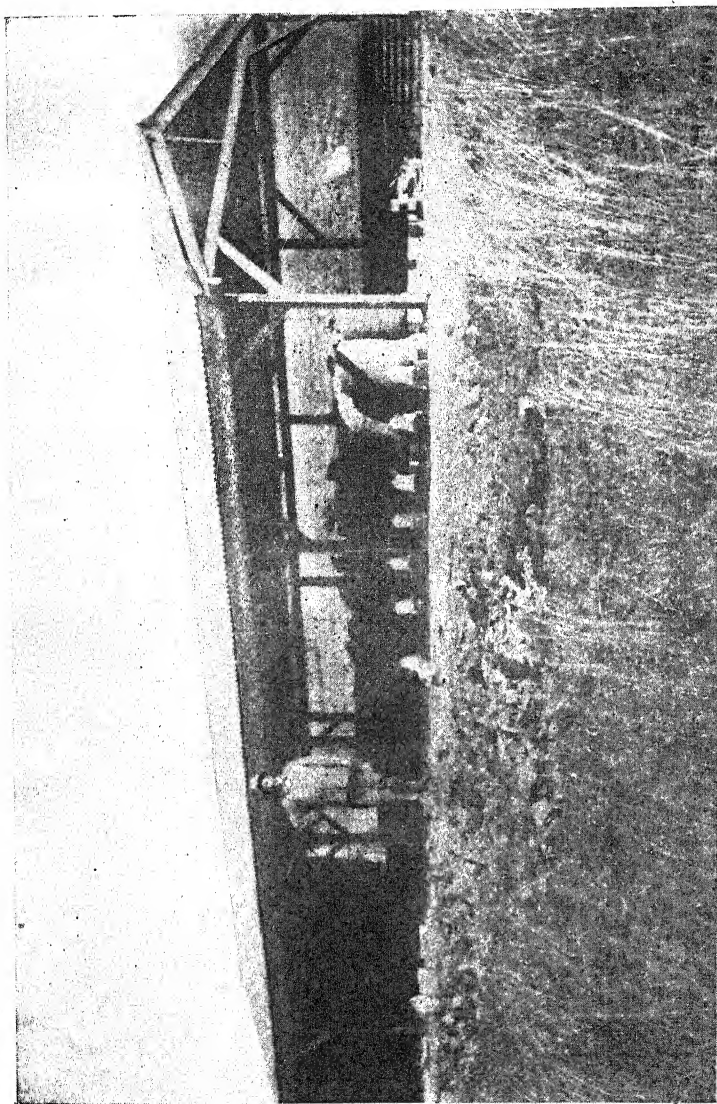
(Specific gravity, 1.0676 at 15.5/15.5 deg. c.)

These oils appear to be a mixture of phenolic and oxyphenolic compounds with hydrocarbons.

An investigation of the actual chemical constituents of the tar is being proceeded with, but it will probably be some time before any definite results are obtained. Experiments on the distillation of wattle wood will be started shortly at Cedara.

Some wattle bark samples from the Midlands of Natal gave the following results:—

			Total Soluble Solids. per cent.	Tannins. per cent.	Non-Tannins. per cent.
No. 1	...	...	38.2	22.2	16.0
No. 2	...	...	51.2	33.6	17.6
No. 3	...	...	50.6	31.9	18.7
No. 4	...	...	43.7	25.8	17.9
No. 5	...	...	43.3	26.5	16.8
No. 6	...	...	40.8	22.6	18.2
No. 7	...	...	45.2	25.6	19.6



A BLOOD-MANURE FACTORY.—I.

View of the Packing-Shed at Mr. Merritt's Establishment.
(See "*Traffics and Discoveries*,")

A sample of clay suitable for brick-making analysed as follows:—

	Per cent.	Per cent. on Dry Material.
Moisture	4'3	—
Silica and Sand	78'8	82'3
Alumina	9'0	9'4
Iron Oxide	4'4	4'6
Unestimated	3'5	—

A mixture of bone dust with offal was submitted for analysis. The results showed its composition to be little different from ordinary powdered bones, except that the content of organic matter was somewhat higher.

	Per cent.
* Moisture and Organic Matter	40'0
Calcium Phosphate... ..	51'3
† Calcium Carbonate, etc.	7'9
Sand	0'8

* Containing Nitrogen 4'2 per cent., equivalent to 5'1 per cent. of Ammonia.

† Containing Lime 3'2 per cent.

CONSERVATION OF CROWN FORESTS.

The Chief Forest Officer, Mr. G. H. Davies, reviews work in the Crown Forests during June as follows:—

Forester Chilvers states that he is still unable to obtain labour for the clearance of the boundaries necessary at Ingeli. He will have to go and look for labourers in the locations. He and all Foresters have been making fire-breaks during the month. Forester Fernando having added another twelve miles of this to his work in May, besides making the plantations safe at Emkazeui. The annual protection from fire is showing noticeable results in the Ingwangwane forest district since 1903, and, coupled with the prevention of Native cultivation, is producing a dense growth of sagewood and other shrubs along the edges and in the "bays" of forests. These are the precursors of high forest trees, which will once more take possession of the ground from which they were driven by fire, axe and the hoe of the Native.

Within the forests, also, the conservative system of marking trees for sale instead of leaving selection to the purchasers is beginning to tell, and the ringing of unsaleable trees that now overshadow the ground—but which would be the only trees left by the uncontrolled wood-cutter in the neighbourhood of his pits—will give the young trees and seedlings access to light and air. This process was authorised by you since my last report, and Forester Fernando is already engaged in giving effect to it in Sections "A" and "B," Xalingena. The result should be noticeable amongst the seedlings a few months after the ringing has

Contraventions of Proclamation 58, 1903, have been rather frequent during June, especially in the Ingwangwane district, in which cases brought up produced fines totalling £7 5s. That district is the most exposed to Native depredations outside of Zululand, where Natives practically have the free run of the Crown Forests Reserves. Forester Hyles, of Imbizana, in Alfred County, obtained fines amounting to £20, besides sums ordered to be paid into forest revenue for damage done.

INDIGENOUS TIMBERS.

An interesting report has been received from Prof. W. R. Dunstan, M.A., F.R.S., Director of the Imperial Institute, upon certain blocks of timber forwarded for examination. The timbers which are the subject of this report were forwarded for examination to the Imperial Institute by this Division through the Commercial Agent for Natal, with letter dated the 6th January, 1909.

The specimens consisted of small blocks of wood representing nine varieties of timber from the Zululand forests. It was suggested that on account of their hardness the woods might be suitable for the manufacture of pipes or for paving purposes.

The woods have been submitted for examination with reference to their general characters to an expert, who has furnished the following report:—

No. 1. Assegai Wood (*Curtisea faginea*).—This is a rather hard, close-grained wood. The heart-wood is reddish-brown, with black streaks, and the sap-wood light brown. The wood is hard to saw, plane and turn, but yields a smooth surface and takes a good polish readily. It does not take nails.

No. 2. Sneezewood (*Ptaeroxylon utile*).—This is a close-grained, brownish-white or cream-coloured wood. It is easy to saw and turn, and takes a good polish, but is hard to plane, as the grain picks up, making it difficult to get a smooth surface. It does not take nails. The wood should be useful in turnery for any purpose where its plain appearance is immaterial.

No. 3. Wild Sage (*Buddleia salvifolia*).—This is a rather open-grained wood of dark-brownish white colour and very poor appearance. It saws and turns easily, and takes nails readily. It polishes moderately, but the resulting appearance is not satisfactory.

No. 4. Lemon Wood (*Xylosma monospara*).—This is a light, lemon-coloured wood, and has rather an effective appearance in parts owing to the "silver grain." It is easy to saw, turn and plane, and takes a good polish. It takes nails moderately well.

No. 5. Thorn Pear? (*Scolopia Zeyheri*?).—This is a rather cross-grained wood of reddish-brown colour. It takes a medium polish, and saws, turns and planes easily, but rips out in the knotty places during planing. It will not take nails. This wood is of little value.

No. 6. Wild Olive (*Olea sp.*).—This is a light coloured cross-grained wood, which takes a fairly good polish. It turns easily, but is hard to saw. In planing the grain picks up and makes it impossible to get a good surface. The wood will not take nails.

No. 7. Black Ironwood, or Wild Olive (*Olea sp.*).—This wood resembles walnut in appearance, but is rather lighter in colour. It is hard to saw, turn and plane, and will not take nails. It takes a good finish when polished, and is the best of the present specimens in appearance. This timber would make a good substitute for walnut, but it is harder to work, and to give it a good finish requires much labour.

No. 8. White Pear (*Apodytes dimidiata*).—This is a close-grained, streaked wood of a greyish-brown colour. It is hard to saw, but easy to turn and plane, and takes a medium polish. It does not take nails.

No. 9. *Mkokuse*.—This is a light, reddish-brown, close-grained wood. It saws moderately hard, but turns easily. It planes easily, but with an indifferent result. It takes a good polish, but loses its faint red tinge in the process. It will not take nails.

CONCLUSIONS.

It seems improbable that these woods could be used for pipe-making in Europe, as they are all light coloured and appear to crack readily. Nearly all the specimens cracked after their receipt at the Imperial Institute, although they were not kept in a particularly warm place.

As regards their possible use for paving and other purposes, the results of the technical examination show that the specimens are of very ordinary quality, and it is impossible to recommend the exportation of similar material to Europe, where it would have to compete with the superior woods already on the market. These timbers would, however, be useful in Natal for a variety of purposes.

It may be of interest to mention that specimens of four of the above timbers, viz., "Assegai Wood," "Sneezewood," "Black Ironwood," and "White Pear," were received at the Imperial Institute from Cape Colony in 1899, and an account of their mechanical and working properties is given in the article on "Colonial Timbers" in "Technical Reports and Scientific Papers" (1903), Part I., pages 268 to 280. The mechanical properties of "White Pear" and "Sneezewood" from Natal are also recorded in the same volume, page 291; the botanical source of the former wood was then given as *Pterocelastrus rostratus*.

AFFORESTATION.

The Chief Afforestation Officer, Mr. F. T. Stayner, reports that the exceptionally late rains experienced in May rather altered the usual routine, replacing gaps in the season's planting was carried out and some

ornamental planting done, the usual fire break work being held over as the grass was abnormally green. Even at the time of writing (July 1st) it does not burn well where the stock have been grazing. The main portion of the fire breaks are now made and will be completed in the course of the next few weeks. The Cedara plantation will then be thoroughly safe from fires approaching from the outside, but the risk of internal conflagrations remains as before, and unless further expenditure is authorised must do so till the trees have themselves cleaned the rank weeds and grass undergrowth now present. A hut has been erected in a commanding position and a native guard stationed there for night watch duty. The seed of *Caryophyllus aromaticus* (clove) received from Zanzibar has been sown at Winkel Spruit and Empangeni, but I am dubious as to the result as the clove is distinctly tropical in its requirements and the temperature at Empangeni drops considerably in winter, as low a record as 42 degs., which occurred on the night of the 17th June, having been already shown this year. No less than 6.97 inches of rain fell at Empangeni during May. During the period under review I have attended three agricultural shows and made several advisory visits, while numerous letters giving advice upon afforestation have been sent from my office. It may be premature to anticipate a revival in planting, but inquiries as to suitable species to plant and with regard to transplants for sale have been much more numerous than previous years. The plantations are now at an instructive stage, which makes personal visits on the part of intending planters of much more avail than anything that can be done by letter. The public do not seem to be taking very great advantage of the new tariff for seeds, viz., 6d. per packet, yet the fact that the Government are offering seeds at this extremely low rate in order to encourage afforestation is evidently not yet known. The packets thus sent out are, of course, commensurate in size with the prime cost of seed, but a 6d. packet of Eucalyptus, for instance, may be depended on to provide several hundred transplants.

The first portion of my 1909 Lecture Course at the School of Agriculture was completed by the end of May, and of the students who sat for the examination on June 2nd, no less than 18, or 47 per cent., passed. At Empangeni the burning of fire brands, harvesting catch crops (mealies, ground nuts, etc.), and cleaning plantations, has absorbed most of the labour, some pruning and thinning having been also accomplished. Forester Tarboton obtained a log of *Barringtonia racemosa* for trial by the Lion Match Company, and it is to be regretted that the report has not been favourable, as a quantity of this wood is available. So far nothing equal to the White Poplar has been found in the Colony.

Olea foveolata was among the indigenous seeds sent in recently, and I passed a few of them on to the Chemist for trial with respect to

their oil contents, as they belong to the Olive family. His report, however, shows but a meagre quantity.

CHICORY.

The following notes are offered in response to numerous enquiries recently received, as to the approved methods of cultivation for chicory. Chicory (*Cichorium intybus*) is valuable both as fodder plant for cattle and sheep, and for the dried root which is used to mix with coffee. It may be grown as a dry land crop, but responds handsomely to irrigation, by which the yield may be increased by 50 to 100 per cent. No commercial trial of the crop has so far been made in Natal, but in a variety test at Cedara yields of roots were obtained ranging from 2,000 to 9,800 lbs. per acre, the latter being harvested from a variety known as Garton's Giant. A cross between "Brunswick" and "Silesian" is said to have been particularly successful in Cape Colony. The Cedara yield is a comparatively low one, more especially when the heavy manuring to which the soil has been subjected previous to planting the crop is taken into consideration: a dressing of 10 tons of kraal manure in addition to 200 lbs. of superphosphate and 50 lbs. of potash chloride having been applied. A liberal supply of phosphates and potash are of importance to this crop; consequently, until further local experiments have been conducted, it will be desirable to manure with the fertilisers mentioned above, omitting the kraal manure.

The crop is one which does not lend itself to constant cultivation on the same soil; where this is practised both quality and yield will be reduced. A rotation embracing maize and some legume is recommended. A soil that is too wet for other crops will be equally useless for chicory, which prefers a moderately dry and somewhat sandy soil. Deep ploughing is essential, whilst subsoiling to a depth of 12 inches should be practised if possible.

With the advent of the first spring rains the seed should be sown in 15-inch drills, and the plants thinned out, when about 4 inches high, to 9 inches in the row. About 2 pounds of seed per acre will be required. A "Planet Jr." drill, which can be obtained in Maritzburg, will be found a most suitable implement for planting.

During growth all weeds should be kept down by constant shallow cultivation, and all flowering stems should be removed as they appear. The crop is ready to harvest "when the lower leaves are turning yellow and the root breaks across with a short fracture and is full of milky juice, not dry and fibrous, in which case the chicory will be gritty and tasteless. Lift the roots in dry weather so as to keep them clean; cut the tops off, but not so low that they will bleed." In Cape Colony the price for ripe fresh roots up to 50s. per ton at the factory.

To grow the crop successfully considerable care and attention is required, and "chicory must not be regarded as a crop from which fortunes are suddenly to be made; but it is certainly worth cultivating where conditions are suitable. Where chicory is found by experiment or previous experience to answer, it is of the utmost importance to farmer and manufacturer alike to arrange and insure that a regular supply will be forthcoming.

Without this the industry of chicory drying and grinding is hopeless and impossible, as witness the fact that factories have for months past been idle, and, unless special inducements offer, and a regular and considerable supply be guaranteed, will not recommence work. Prospective growers would therefore do well to come to some arrangement with manufacturers previous to embarking on the cultivation of chicory, and it would seem particularly desirable that a number combine, so as to furnish the necessary amount and to distribute the supply over a longer time." The foregoing, taken from the *Cape Agricultural Journal*, will serve as a note of warning regarding the danger of investing capital and enterprise in the growing of chicory without first securing guarantee that there is an assured market for the roots.

E. R. SAWER,

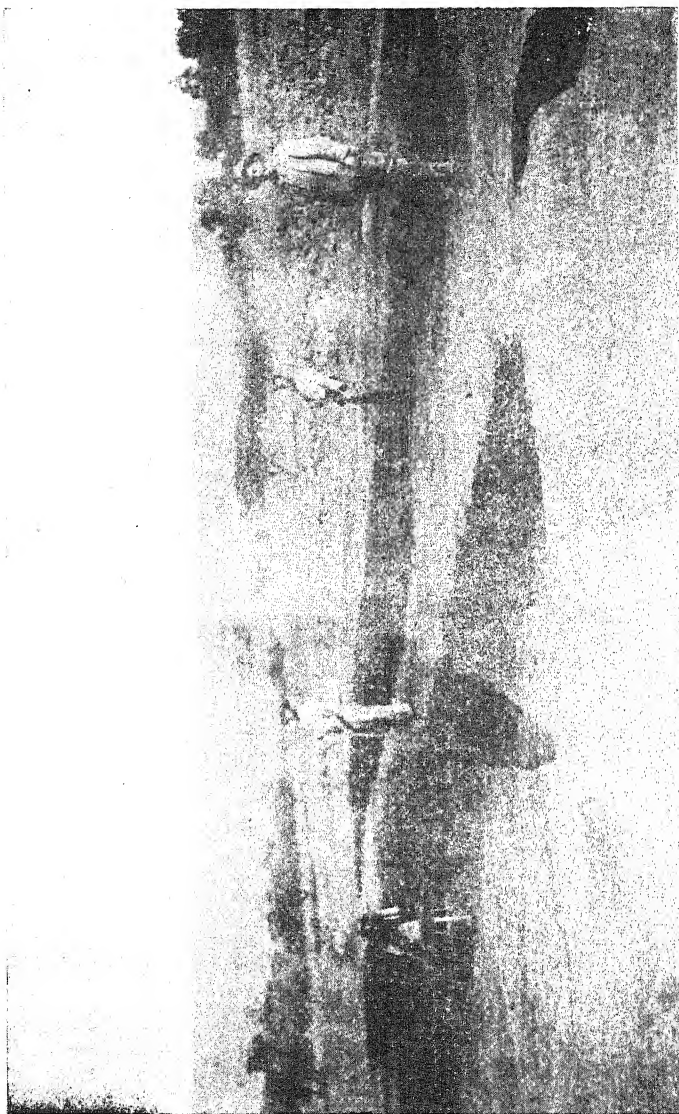
Director of Agriculture and Forestry.

20th July, 1909.

Heavy winter layers are generally poor summer layers, and *vice versa*.

Mr. George Ross has been appointed, under Section 6 of the Agricultural Development Act of 1904, to be a member of the Land Board, for a period of three years from the 1st July, 1909.

Rules and Regulations for the disposal of Crown Lands in Zululand, other than Crown Reserves, Special Reserves, and Township Reserves, were published in the *Government Gazette* of the 29th June.



A BLOOD-MANURE FACTORY.—II.

The Drying-Grounds, where the manure, after having been cooked, is spread out to dry.
(See "*Traffics and Discoveries.*")

"Traffics and Discoveries."

NOTES AND INTERVIEWS BY OUR TRAVELLING
COMMISSIONER.

III.—WHAT GOVERNMENT IS DOING FOR THE CITRUS FRUIT INDUSTRY.

IT is now a considerable time ago since the first reference to the possibility of establishing an export trade in citrus fruits to England was made in the pages of the *Agricultural Journal*. Who first thought of the idea history does not relate; probably, as is the case with many ventures of this kind, no one person can be credited with the discovery of Natal's potentialities in the growing of citrus fruits for export; but at any rate the idea has grown and has materialised until now, in the third year only of experimenting, something like cases are being despatched weekly to the great oversea market, and the prospects for future years are perhaps everything that could be desired.

Whoever the person or persons may be who were responsible for the conception of the idea of exporting citrus fruits, there is no doubt that it is Mr. Fuller's energy and expert knowledge that has made the export of citrus fruits the success it is. It is one thing to have possibilities; it is another thing to take advantage of them; it is still another matter to take advantage of them to the full. The possibilities we have; Mr. Fuller and his staff have taken advantage of them for the Colony, proving that they are sound possibilities; it remains now for the Colony as a whole to take advantage of those possibilities to the full.

Casually strolling down the Point Road, Durban, where it passes the Alexandra Square, one little dreams of the busy hive that, ensconced in the African Boating Company's building, is building up the nucleus of what will probably in the near future be one of Natal's most important lines of activity—the export of citrus fruits. From the wharf come the usual noises connected with shipping, but no sounds issue from the first floor of the African Boating Co.'s premises to mingle with those of the street and the shipping and give a clue as to what is taking place within; there is certainly usually a pile of fruit boxes in front of the building, but there are piles of cases to be seen almost everywhere at the Point, and no special significance is attached to the presence of these particular piles of fruit boxes.

The meaning and the importance of the presence of these fruit boxes begins to dawn upon us when we go upstairs and behold the sight of a considerable number of girls seated at long tables and busily engaged in picking fruit in trays, of boys grading naartjes, of other boys nailing down tray-lids and trapping the trays together with iron

straps, of still more boys trundling along long narrow padded boxes filled with naartjes, of piles of trays waiting to be put on to the lift and held ready for shipment. Then we commence to realise what is happening; we begin to understand that this is really the Government Fruit Packing House which, under the direction of Mr. Claude Fuller, Chief of the Division of Entomology and Horticulture of the Department of Agriculture, is demonstrating what Natal can do in the direction of the systematic export of citrus fruits, and is laying the foundations of a big industry in the near future.

Such, at any rate, were my impressions as, one day early in July, I visited the Packing House on behalf of the readers of the *Journal*, and sought out Mr. Fuller.

"I seem to have come on an extra busy day!" I remarked, as I glanced around at the crowd of busy workers.

"Oh, no," Mr. Fuller replied; "we are like this every day almost: we are always busy down here!"

"You are having a good season, then?"

"Yes, so far as the patronage of growers is concerned——"

"The idea is being well supported, then?"

"Very well supported. The fruit is coming in fast every day. You saw that pile of fruit cases outside on the pavement? Well, we have to get through that much every day, and it means a lot of overtime to do it, I can assure you! The season is not a good one for fruit, however, on account of the abundance of rain we have had."

"At what rate have you been shipping, Mr. Fuller?" I asked.

"In the first eight shipments of the season alone we shipped double the quantity of fruit that we sent during the whole of the thirteen shipments of last season."

"Do you have to reject much fruit?"

"Not as much this year as last. Growers are beginning to realise the importance of sending good fruit. We are having more rejects of oranges than of naartjes, but, of course, the naartje section of the business is by far the larger and more important."

Mr. Fuller then showed me around the establishment, commencing with the graders.

"Here you see the boxes of naartjes being opened up and the fruit graded. As you see, each grader consists of six run-ways leading from as many holes of different size (according to the grades fixed upon) in a board and emptying into these padded boxes."

"The fruit is graded by hand, then?"

"Yes, but there are four graders, and these can keep all the girls going quite well."

"When these padded boxes are full they are run across to the packers," Mr. Fuller continued. "We have —— girls packing naartjes, and they are kept going steadily."

Mr. Fuller then led the way to the packing tabls. Here the fruit was being wrapped up, each one separately, in coloured tissue paper, and neatly packed in tissue paper shavings in trays adorned with white lace paper. The "packs," of course, varied according to the grade of the fruit. The best grades were wrapped in "silver" and "gold" paper and packed in a mixture of tissue and tinsel shavings. All grades, however, looked very effective, and would make a good display in any London fruiterer's window.

"What system have you of indicating the grade of the fruit each tray contains, Mr. Fuller?" I asked.

"The grades are described on the trays by the use of such words as 'choice,' 'fancy,' and so on; but the best indication of the grade is what we call the 'pack'; that is to say, the number of fruits in each tray. The number is marked on the tray. Of course, the fewer the number the larger the fruit."

"After the trays have been packed and the lids nailed on, they are, I think, strapped together with iron straps, are they not?"

"That is so—the trays are strapped together into cases or 'lugs.'"

The lidding of the trays and the strapping of them together was being done by European boys; and the same labour was employed for most of the other work. In fact, it was pleasing to see white labour employed throughout this section of the establishment.

"When the lugs are ready for shipment they are taken down on the lift to the ground floor, where you will see, directly, great piles of them waiting to be transhipped to the steamer."

In a few minutes we ourselves were down on the ground floor, where I found, as Mr. Fuller had said, large piles of cases, all ready packed for shipment. All these cases had to go by that week's boat (the shipments being, of course, made weekly), and they furnished very eloquent testimony to the energy of Mr. Fuller and his staff.

Thence we went across the road to the orange packing house. Here things were done on a very much smaller scale, as comparatively few growers are exporting oranges as yet. The oranges were not being packed in trays, as the naartjes were, but in boxes. All the fruit were being carefully graded, however, and each orange wrapped separately in coloured tissue paper.

With the visit to the orange packing house my "interview" came to an end, and I left Mr. Fuller much impressed by what I had seen and with visions of a future wherein a great packing establishment, employing hundreds of hands and dealing with millions, instead of thousands, of fruit figured largely, and when the growing of citrus fruits would be one of the greatest farm industries of the country. How near that day may be no one can prophesy, but let us hope it is not very far distant. Things sometimes move rapidly in this sub-continent.

IV.—WHERE BLOOD MANURE IS MADE.

A MORNING WITH MR. MERRITT.

Rarely, perhaps, is the truth of the saying, "It's an ill wind that blows no one any good," so wonderfully proved as it is now being in the case of East Coast Fever. To most farmers, and to the country as a whole, this fell disease has come as a curse, and to suggest that it might be of some good to individuals if not to the country is to court a general verdict that you are something of a crank, that you are a person with a distorted mental vision who can see nothing but doubtful good in things evil. Nevertheless, even in the case of such a scourge as East Coast Fever there is always someone to profit, and such a fortunate individual exists in the person of Mr. Wm. Merritt, who is turning to commercial account the actual blood of the animals that are daily being slaughtered at the Government Abattoirs in Maritzburg and Durban, drying it and turning it into a valuable nitrogenous manure.

Mr. Merritt began operations about eighteen months ago in a small experimental way at the Government Abattoir in Maritzburg, and, meeting with success, he finally decided to commence manufacturing blood manure on a large scale. Accordingly he acquired a piece of land close to Bisley Station, near Maritzburg, erected there his shed and coppers, and laid out extensive drying grounds; and it was there that I looked him up recently to see what progress he was making.

Mr. Merritt's works lie about 100 yards from the railway station, and they have the advantage of being on a lower level than the railway, so that the barrels of blood, as they are received from Maritzburg and Durban and off-loaded, can be easily rolled down the slope. The finished manure, being in the form of a clean, dry powder, is packed in sacks, which are more easily handled than barrels, so that it is not a difficult matter to get the finished product up to the railway for entraining to its destination.

When I reached Bisley I found Mr. Merritt engaged in superintending the despatch of ten tons of manure which he was sending off in fulfilment of an order from Durban, and when his task was finished we walked down together to the works.

"That ten-ton consignment looks like business!" I remarked appreciatively.

"Yes—the demand for my stuff is gradually growing as farmers are getting to know it," replied Mr. Merritt. "And I have had some good accounts, too, of it from those who have used it. Mr. ———" (mentioning the name of a well-known farmer and M.L.A. on the South Coast) "says he considers it is grand stuff for sugar cane, and I have heard from one or two other sugar-cane growers to the same effect. Of

course, there has not been sufficient time for many farmers to give it a trial, but all who have tried it for various crops that require nitrogen speak well of it. It has been found good for mealies too," and he took from his pocket and showed me a letter from an M.L.A. and well-known farmer in the Northern Districts, who stated that he had used the manure on mealies and had obtained a return at the rate of 30 muids to the acre.

"Of course, there must have been the necessary phosphates in the ground for the formation of the grain," Mr. Merritt commented, "but you can't produce big cobs on small mealies, and I expect my blood manure produced the healthy plants that are necessary if full advantage is to be taken of the other manures applied. It was a marvellous crop for that district, anyhow. Besides field crops, vegetables do well with dried blood; and, by the way, you will probably be interested to hear that my stuff keeps off white ants."

"Really?"

"Apparently so. I find—and others have told me the same thing, too—that, by applying this dried blood to rose-bushes, for instance, that are being attacked by white ants, the ants are driven off entirely."

"By the ammonia fumes, I suppose?"

"Presumably. Anyway, that's what I have found; and when I first made the discovery I made a definite experiment with a couple of posts that were infested with white ants. Around one of them I put a little heap of the manure, and very soon the ants had quite gone."

"That is very interesting," I remarked, "and I daresay those of our readers who live on the coast and keep gardens will be glad to know it."

By this time we had reached the works, and Mr. Merritt proceeded to show me around and explain the processes by which the manure is made.

"These," he commenced, "are the coppers for boiling the blood; the blood you see inside them has been cooking for hours and will soon be ready to be taken out and dried. The cooking, of course, evaporates most of the superfluous moisture in the blood."

The contents of the coppers were not good to look upon, as may be imagined, but they were less objectionable than they must have been when the raw blood and refuse was first put in, since most of the moisture had been dissipated by the cooking and there were left large masses of tough, doughy-looking stuff that was once blood, but was now well on its way to being a valuable nitrogenous manure.

"This is where the blood is dried after it has been cooked," Mr. Merritt proceeded, indicating a large drying ground. "The boys, as you see, are raking it over so as to dry it as quickly as possible. When it is properly dry it is like this," and he handed me what looked like a black, very compact cinder, as little objectionable as the moist, steaming stuff on the ground was the reverse.

"And after that?"

"Then it is either ground up small or sent off just as it is. Some farmers prefer it unground—for one thing, of course, it is cheaper in that state,—while others like to have it in the form of a powder."

Leading the way to the packing and storing shed, Mr. Merritt showed me samples of ground and unground manure, the former for all the world like coarse gunpowder. He also showed me samples of other forms of blood manure he was experimenting with: one of them of a reddish-brown colour and containing somewhat more nitrogen than the ordinary kind. These samples were prepared by a process which Mr. Merritt himself discovered, and I am consequently not at liberty to publish any details. Mr. Merritt's aim is to turn out increasingly valuable manure, and at the same time gradually to lower the price, and he is meeting with considerable success in both directions. The most popular form which his blood manure takes at present is in the rough unpowdered state, just as it leaves the drying ground, and Mr. Merritt is selling considerable quantities of this.

Mr. Merritt is carrying on various experiments with his different forms of blood manure mixed with other substances, and he hopes to produce shortly complete manures for various crops. His enterprise is commendable, and I hope to see this new South African industry go ahead largely in the future.

V.—THE "NATAL" SPRAY PEN.

Readers of the *Natal Agricultural Journal* are already aware of the existence of the "Natal" Spray Pen, invented by Mr. H. Watkins-Pitchford, Government Bacteriologist, and they had, last December, a good opportunity of studying the device for themselves, since in the issue of the *Journal* for that month there appeared a descriptive illustrated article by Mr. Pitchford himself. There is thus no need for me to endeavour to describe the invention here, nor is this my present purpose. All I want to do is to remark upon a practical demonstration of the working of the appliance which Mr. Pitchford gave just before the Durban Show and at which he very kindly invited me to be present.

The three illustrations of the pen which are published in this issue of the *Journal* give perhaps as good an idea as could be wished of the appearance and, to some extent, the method of working of the pen. From them it will be gathered that the principle of the device is the spraying of the animal by means of (a) a series of roof jets which account for the animal's back and top of the head, (b) two sets of side jets, which drench the beast's flanks, and (c) two sets of floor jets, which thoroughly wet the belly and under parts generally of the animal. These three series of

jets are controlled by means of three cocks (shown in the side view of the pen), and are turned on alternately so as to get full pressure on to every part of the animal. Pressure is supplied by means of a pump, which, as can be seen in the first picture, may be worked by means of ordinary horse-gear. A pressure of 30 lbs. to the square inch is the force applied (the pressure that is being developed by the pump is watched by means of a guage); a safety valve removes all possibility of a catastrophe.

At the demonstration which Mr. Pitchford gave at the beginning of the month a horse-gear attachment to the pump was used, and it gave very satisfactory results, the pressure, which was reduced, of course, by each spraying, being rapidly brought up again to the required 30 lbs. Doubtless if it were desired to put animals through very quickly a larger pump would be found preferable (a hand pump is shown on the left of the first picture), but for all ordinary purposes the 6-inch pump which was being used at the demonstration would be quite suitable. As Mr. Pitchford remarked, no great expense has to be incurred, in connection with his Spray Pen, for the pump, since many farmers have horse gear; and even if horse gear is purchased to work the spray pen the money spent on it is not expenditure involved exclusively for the pen, since the gear can be used for other purposes on the farm. Where a pen is erected by a co-operative association, or similar body of farmers, however, there would be many more cattle to be put through than in the case of a pen installed on a private farm by a single individual, and at the same time the organisation would be better able to afford the purchase of a large pump, if such were considered necessary.

The pen is not of complicated construction, nor will it be as expensive to erect as an ordinary cattle dipping tank. But the direction in which it especially commends itself to the farmer—in fact, this is the aim of the pen—is the effective way in which it drenches the animals, a recommendation which few other forms of dips or sprays can boast of. It has been called a "spray pen," but I rather think "*drench* pen" would have been more descriptive! The pen certainly leaves nothing to complain of on this score, as we found in examining each of the animals after it was put through. The ears were drenched as effectively as any other part of the body, and the same can be said of the parts between the legs, as also—in the case of a couple of cows that were put through—the udder. Everywhere, as far as we could see, the hair was wet right to the actual skin—and we examined each animal very carefully. This was after about 15 to 25 seconds' spraying only, from which the effectiveness of the spray may be judged.

The effectiveness of the pen in the matter of spraying, though the principal, is not the only important point in its favour. The purchase of dipping mixtures is a consideration with most farmers; and it is in this direction also that the "Natal" Spray Pen scores, for the dip can be

used over and over again for hundreds of animals, while it keeps good for an indefinite period in the storage tank. An objection has been raised in the daily press to the effect that the jets are liable to become clogged with refuse brought in by the animals. Such clogging, however, is practically impossible, because after the dip has been used and runs from the floor of the pen through the grating it passes through a strainer, which removes all the refuse and coarse particles generally from it. Apart from this, the ends of the supply pipes in the pen are fitted with screw caps which can be removed and the pipes cleaned. No refuse can thus, even if it does manage to get into the pipes, remain long behind the jets, while no particles can secure a lodgment in the jets themselves—which are nothing more than holes bored in the pipes—on account of the pressure of the spraying fluid.

Mr. Pitchford's appliance is probably the most effective apparatus for its purpose that could be had, as the demonstration proved, and I feel sure that as it comes to be known among farmers it will be well taken up.

The Position of East Coast Fever.

LIST OF OUTBREAKS DURING JUNE-JULY.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 21st June to 20th July:—

Weenen District.—Outbreak on farm "Waterfall."

Umvoti District.—Outbreaks on farms "Driefontein" (sub-division of "Pampoen Nek"), and Mr. H. R. Oellerman's portion of "Weltervreden."

Utrecht District.—Outbreak on farm "Geithoulboom."

Krantzkop District.—Outbreaks on farms "Salem" and "Krantzkop."

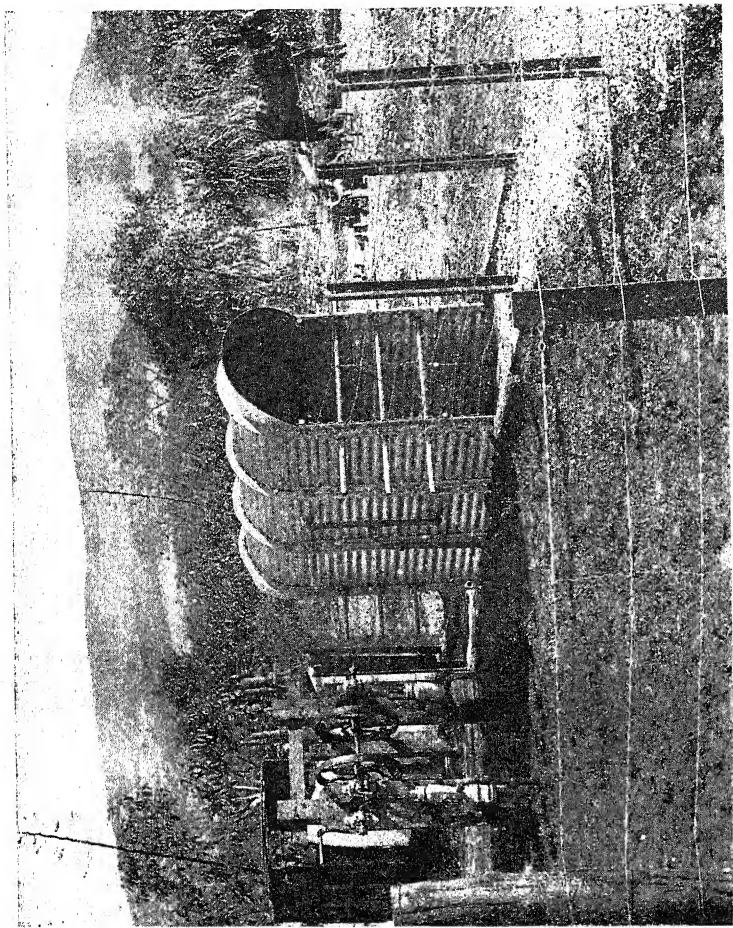
Umgeni District.—Outbreak among cattle of Mr. H. F. Fynn, Fox Hill.

Lion's River District.—Outbreaks among Natives' cattle on farm "Reit Vallei."

New Hanover District.—Outbreaks among Mr. Peters' cattle on farm "Spitzburg," and Mr. J. Boddy's cattle on farm "Mount Pleasant."

Isopo District.—Outbreaks on farm "Carrot," and Location No. 6.

No record is kept of outbreaks in the following Magisterial Divisions:—The whole of the Province of Zululand, the whole of Victoria County, Umsinga, Vryheid, Ngotshe, Babanango, and Paulpietersburg.



THE "NATAL" SPRAY PEN.—I.

General View of the Pen, showing horse-gear on right and hand-gear pump on left.
(See "*Traffics and Discoveries*,")

Durban and Coast Agricultural Society.

NINTH ANNUAL SHOW.

A SUCCESSFUL EXHIBITION.

THE Durban and Coast Society of Agriculture and Industry held their ninth Annual Show on Wednesday, Thursday, and Friday, the 7th, 8th, and 9th July, at Lord's Ground in Durban, in wet weather. Fortunately the rain did not at any time develop into a downpour, and though the weather was exceedingly unfavourable it did not prevent the judging. Owing to the unfavourable conditions, however, our representative was unable to take any photographs at the show. The Durban Show this year created another South African record, beating in point of combined entries the previous best shows held this year at Johannesburg, Port Elizabeth, and Rosebank. The entries were: General show, 1,830; dogs, 966; poultry, 987; making a total of 3,783, which was an increase of 477 over that of last year. The general exhibits were 60 below the number of last year; however, this would not have been the case had the machinery section been competitive, instead of, for the first time, non-competitive.

JUDGES AND STEWARDS.

The following is a list of the judges and stewards, omitting those officiating at the sports and at the Kennel Club Show:—

Horses, Mules and Donkeys.

Thoroughbred Horses.—Judge, Hon. F. H. Schimpers, M.L.C. Stewards, Marshall, F. L. Goble, G. Macdonald, W. Greenacre, C. T. W. Swales and S. T. Amos, M.R.C.V.S.

Hackneys, Cleveland Bays, or Yorkshire Coach or Cart Horses.—Judge, F. Hutchinson, M.R.C.V.S. Stewards, C. C. Randles, J. A. Dales and Colin Wilson.

Polo Ponies.—Judge, W. M. Power, M.R.C.V.S. Stewards, J. R. Arthur and B. R. Swales.

General Horses.—Judge, W. M. Power, M.R.C.V.S. Steward, H. Sparks.

Harness Horses.—Judge, A. McNae, M.R.C.V.S. Steward, Geo. Edwards.

Saddle Horses.—Judge, F. A. Verney, M.R.C.V.S. Stewards, H. Hatchin, P. Jamieson, O. Davis, P. Piccione, P. McKenzie and F. Stayner.

Mules and Donkeys.—Judge, C. Jackson. Steward, P. Piccione.

Sheep.

Merino Sheep.—Judge, C. E. Hancock.

Shropshire Down Sheep.—Judge, H. Stedman. Steward, G. Monhaupt, junr.

Down Sheep (other than Shropshire).—Judge, H. Stedman. Steward, C. J. Glen.

Persian Sheep.—Judge, Hon. H. D. Winter. Steward, A. H. Burman.

Long Wool Sheep.—Judge, H. Stedman. Steward, W. T. Buttery.

Cross-bred and Fat Sheep.—Judges, Hon. H. D. Winter and W. J. Thompson. Stewards, H. B. Evans and W. Anderson.

Goats and Pigs.

Angora Goats.—Judges, Hon. H. D. Winter and W. J. Thompson.

Pigs.—Judge, John Marwick. Steward, F. Brown, junr.

Vehicles.

Carts, Carriages, Wagons.—Judges, W. F. Goodwin and D. Taylor, M.L.A. Steward, G. L. Dalton.

Farm Produce.

Roots and Tubers.—Judge, A. Reid.

Kafir Corn, Mealies, Samp, etc.—Judges, J. Westbrook and E. Sawyer. Stewards, Marshall, F. Stevens, C.M.G.; assisting, P. G. Steber, T. Burman, S. Deane, G. W. Cooke, W. A. Bath and J. S. Fowle.

Table Fruits.—Judge, T. R. Sim. Stewards, H. Burman and W. F. Taylor.

Vegetables.—Judge, T. R. Atkinson. Stewards, F. H. Tunmer and W. C. Dawber.

Dairy and Food Classes.

Cheese and Butter.—Judge, A. Lawrence. Stewards, J. M. Wilson, A. Williamson and S. H. Chandler.

Bacon, Meals, etc.—Judge, J. J. Carugatti.

Bread, Biscuits, Sweets, Jams and Fruits.—Judge, W. Merrick.

Cordials, Syrup, or Aerated Waters.—Judge, A. Allerston.

Ale and Stout.—Judges: F. Stevens, C.M.G., and H. H. Puntan.

Rum.—Judge, H. H. Puntan.

Home-made Productions.—Judges, Mrs. E. W. Evans, Mrs. A. Henderson, Mrs. Trotter and A. Allerston. Stewards, H. B. Tremayne, G. Burns and A. Law.

Miscellaneous.

Tobacco.—Judge, E. Sawyer. Stewards, W. Poynton and C. F. Glen.

Fibres, Coffee, Chicory.—Judge, E. R. Sawyer.

Natal Tea.—Judge, J. M. Wilson.

Honey.—Judge, Sub-Inspector G. Stanley. Steward, W. C. E. Roberts.

Classes 387, 388, and 401-418.—Judge, John Fletcher, M.I.C.E.
Harness and Leather.—Judge, A. A. Gibson.
Horse Shoes.—Judge, S. T. Amos, M.R.C.V.S. Steward, J. M. Arthur.

THE OPENING.

At one o'clock the opening ceremony was performed from the grandstand, the Show being declared to be formally opened by His Excellency the Governor (Sir Matthew Nathan), who was suitably introduced by Mr. E. W. Evans, the President of the Society. Amongst those present were the Mayor (Mr. C. Henwood), and the Hon. Marshall Campbell.

The Governor spoke as follows:—At every agricultural show that I have attended since I came to Natal, I have had to deplore the absence of cattle exhibits, and so I must to-day. Not only has East Coast Fever deprived this exhibition of what I understand used to be its most prominent feature, but it has also militated against the show of produce by increasing the difficulties of bringing it to the railways. We have to seek comfort in these matters from the good that has come, and may still come, out of evil.

In the first place, stock disease has made men look to other uses of the land besides the grazing of cattle on it, and has brought them to realise the value of the old adage that it is unwise to carry all one's eggs in one basket. I think it is to a further realisation of the truth of this saying that we owe the starting of a new Coast industry. It has occurred to some thinking people that growers of cane-sugar have suffered badly from loss of markets before now, and that it would be well to supplement that crop, which from the circumstances of its production can only have a South African market, by some other which can supply a demand from other parts of the world. We are all watching with interest Mr. Marshall Campbell's large-scale experiment of growing wattles in the Coast belt, and hoping that the prophecies of those who predict failure owing to too rapid growth, and to other causes, may be falsified. If it succeeds, and along the 250 miles of our Coast Railway wattle plantations alternate in pleasing colour-contrast with cane-fields, Mr. Campbell will deserve a place in the honourable list of those who have added to the potential wealth of their country; near the top of that list I always place the originator of the wattle industry, Sir George Sutton.

I shall not on this occasion dwell on our agricultural advance in other directions illustrated by the produce sections of this Show—on the sugar of which we expect to distribute 70,000 tons in South Africa this year, on the maize of which we are promised a nearly record crop of 750,000 muids with 350,000 muids for export, on the fruit of which we have sent more than double as much to England in the first eight shipments of this year as in the whole thirteen of last, but I shall pass to the other matter in which out of the evil conditions of the present we

may expect benefit in the future; I refer to transport. Ox transport spreads cattle disease and becomes impossible when cattle disease has spread. We do not want to revert to it when the disease has abated. We must have for bringing our produce to market light lines connected with our main railways, and good roads suitable for mechanical transport feeding our light lines. It is no doubt largely due to East Coast Fever that the pressing need for light railways has been realised by Parliament and Government, that the Mid-Illovo is to be commenced at once and to be completed in eight months from now, and that the Alfred County line is shortly to be put in hand. And, remembering a conversation I once had with Sir Thomas Price, I do not fear that when the Union Government takes over the railways of the Colonies there will be any check in construction of these communications. When that transfer occurs, roads, boats and bridges will still be left to the local government. With the experience of East Coast Fever transport difficulties behind them I should think town and country alike will press on the men they send to the Provincial Council the need of a vigorous road policy, making possible the extensive employment of mechanical traction.

A few words with regard to to-day's Show. The number of entries does not differ greatly from the number last year. There are a few more horses and sheep, and the show of these animals is good. The exhibition of goats and pigs is inconsiderable. Agricultural produce shows an improvement, and a noteworthy new class is 188, in which a special prize is given for Coast county exhibits. I have not been informed why Durban has feared to show beside Alexandra and Victoria Counties in this class; next year no doubt all four Coast counties and Zululand will enter. The number of table fruit exhibits is greater than last year; I have been told that in the past the Society has not done all it might for the systematic encouragement of the fruit industry of the Coast, and that special effort on its part is necessary if this industry is to be taken up and made the most of by progressive and keen European growers of the right sort. Natal sugar is much better represented this year than last, but there are only two entries for Natal tea. Honey and dairy products show well. The most important fresh feature of the exhibition is the new Industrial Building, in which 24 sites are fully occupied by representations of local industries. It is on local industries that the towns of South Africa depend to be kept free of the class of larrikins which has grown up in Australian cities, and this adds another to the many reasons why the public should follow the lead of this Society in doing all it can to help on the growth of such industries.

Apart from the exhibition of the Durban and Coast Society of Agriculture and Industry there is in this enclosure the separate shows of the Natal Kennel Club and the Durban and Coast Poultry Club. In both of these the numbers of entries show a large and gratifying increase on the numbers for last year.

In conclusion I wish once again to voice the public appreciation of the excellent organisation of these annual shows by the committees of the Agricultural Society, and of the Kennel and Poultry Clubs, and I should like to take this opportunity of drawing special attention to the great extent to which the Agricultural Show is indebted to the considerate and courteous attention always given to exhibitors and competitors by the Society's secretary, Mr. John Morley.

I declare the Ninth Annual Show of the Durban and Coast Society of Agriculture and Industry, and the Shows of the Natal Kennel Club and the Durban and Coast Poultry Club to be open.

SOME NOTES ON THE EXHIBITS.

The number of entries in the thoroughbred classes was not equal to that of last year; however, the quality of the animals shown was good. The Cleveland Bay or Yorkshire Coach was a peculiarly unfortunate section, there being practically no entry. Mr. Wm. Wood, of Woodfield, Nottingham Road, had entered his bay colt "Woodfield Prince" in the class for yearling colts of S.A. breed, and also his bay "Molly" in the class for fillies of two years, S.A. breed, but at the last moment was unable to send the animals. These being the only entries, the classes fell through. Nor was there a stallion, imported or S.A. bred, a two-year-old colt, also of S.A. breed, a mare imported or S.A. bred, or filly, yearling, S.A. bred, on show. Thus this section was one of the few failures amongst the horses. Had it not been for the fact that the Durban Corporation made something of a show, chiefly with mares, the section for cart horses would have also suffered from want of entries. The classes for stallions of three years and over, S.A. bred; colts, two years, S.A. bred; colts, yearling, S.A. bred; fillies, two years, S.A. bred; and fillies, yearling, S.A. bred, failed completely to fill.

The entries in the sheep section also fell short of last year's, but the quality was good, although, again, little or no improvement was observed as compared with the last show. An interesting feature was the exhibit by the Government of haired Persian sheep. These animals had been crossed with Merinos, and their progeny was also exhibited. This was purely an experiment, but the result did not find favour with the experts, and the opinion was expressed by the judges that further experimenting was inadvisable, owing to the fact that the progeny was very unproductive, from a wool point of view, whilst it was very difficult to give them a name. For the mutton, however, the experiment has been proved to be a success. The Persian sheep, which were brought from Cedara for the purpose of exhibition only, were of exceptionally large size. There was an excellent display of slaughter sheep, and Shropshire ewes also were very prominent. Fat lambs,

both Merinos and cross-breds, made a fine display; indeed, this may be said to have been the best section of the sheep. The most improved section was the Shropshire Downs, and the wool this year appeared to be of finer texture. This breed of sheep is meeting with great favour amongst our Midland farmers, although it was at first a moot point as to whether the pastures in that part of the country would be suited to the breed. The prizes in the Persian exhibits were secured by the animals showed by the Government. This breed is also receiving considerable attention by the farmers, and it is with them that the hope of an export mutton trade is being built. The wool of this breed is not considered to be of very good quality; however, the carcase is good. The display of wethers, clipped within two months of the show, was a good one.

Goats were very scarce, and so also were pigs. The entries in these sections showed a great falling off as compared with previous shows. However, in spite of this, it must be said that some exceptionally fine animals were on view.

The feature of the dairy produce, meat, etc., section was undoubtedly the cheese, of which there was something like three tons on show. It was magnificent cheese of the cheddar type, varying in sizes from 10 to 500 lbs. There is no gainsaying the fact that the quality of the exhibits was a long way ahead of last year, which is saying a good deal, for, according to the judges, the 1908 quality was the best on record. But then cheese-making in Natal was comparatively a young industry, and in the intervening twelve months it has gone ahead by leaps and bounds, and the quality of the South African cheese has been brought to a high standard, and it is safe to say that imported cheese is doomed so far as South Africa is concerned. Eggs were very scarce, the present time being the off-season. However, one would have expected to see a slightly larger collection of eggs on show. There were but two entries for white and three for brown, and in the latter only one exhibited.

The display of South African agricultural produce was a magnificent one. Dealing with the section in detail, one was struck with the general excellence of the entries, and, as regards the prize-winners, the judges were agreed that nothing better had ever been shown in Durban; in fact, one would almost conclude that many of the successful competitors must have devoted their time to producing samples, and, with regard to the unsuccessful competitors, it might be observed that they entered nothing which would not have found a prominent place in a show where the specialist element was less in evidence. Beans, according to the judges, were the best that have been seen on Durban shows. They were, without exception, large, clean, and healthy-looking. There was only a meagre show of peas, but with this exception the pulses were admitted to be all round first-class. In the grain section

of agricultural produce barley was poorly entered for, there being only three competitors for malting barley and a similar number for the other varieties. Ground nuts were only represented by two entries, notwithstanding the inducements held out for these productions. Hay and forage did not elicit a big show, and there was little competition. Maize, as usual, was the feature in agricultural produce. In the numerous varieties for which prizes were offered all were well entered for, and competition was even more keen than it was last year. The grain was large, clean, and well bagged. With the closest scrutiny the judges failed to discover any appearance of inferior or wasty grain. The cobs were of large size and the grain, bold, round, and well developed. Roots were, if anything, superior to those exhibited last year. Mangolds and turnips were large in size and remarkably free from any appearance of sponginess. The competition in both these roots was severe. This was likewise the case with potatoes. Sweet potatoes, however, did not evoke much competition. Pumpkins, too, were not largely represented, but those shown were aptly described as magnificent. Other classes in produce, such as wattle bark, were not represented to anything like what it would have been, considering the extent of this industry. But altogether the produce section gave evidence that Natal farmers are adopting up-to-date methods of cultivation with improved implements and a more liberal use of artificial manures. As one expert remarked, there was in every part of the produce hall ample evidence that the Natal farmers have begun to harness science to the plough.

In the competition in fruit for export most of the exhibits were attractive. Messrs. H. Howard and G. North, Northdene, and Mr. M. L. Cope, Pinetown Bridge, to all of whom were awarded first prizes, had some very daintily-packed trays or cases of fruit.

The two important factors for the brood sow are proper food and plenty of exercise.

Depth of rib, together with the well-sprung rib of a wide horse, means heart, lung and digestive capacity.

Data for Sugar Planters.

SOME USEFUL NOTES AND FIGURES.

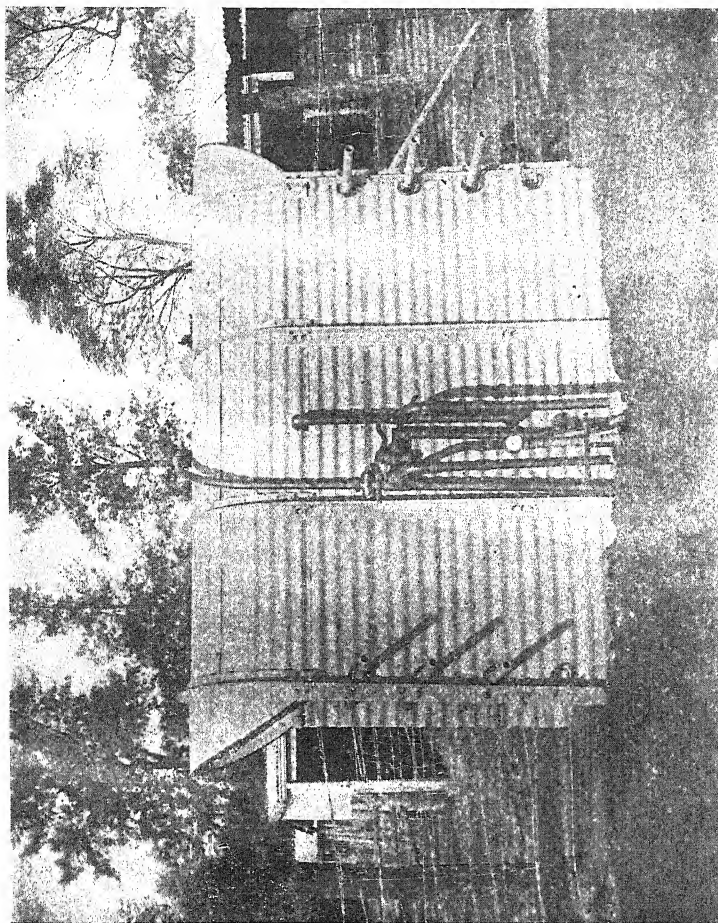
At a meeting of the Barbados Agricultural Society, held on Friday, May 28th last, the Imperial Commissioner of Agriculture read a paper on the subject of Central Sugar Factories. In order to make clear his arguments, Dr. Watts brought forward a good deal of useful data. The following notes, formulæ, tables, etc., having reference to the relationship that exists between the percentage of fibre in canes, and the yields of juice and sugar that may be expected under different manufacturing conditions, are reproduced by *Agricultural News* (Barbados) from the paper, as being of general interest and value to sugar planters:—

Our ideas concerning the composition of canes and the amount of juice which it is possible to obtain from them may be rendered much clearer by a very simple formula, which, although not perfectly accurate, affords approximations that are sufficiently near for our purpose. The quantity of juice contained in a cane may be calculated approximately thus:—From 100 deduct one and one-third times the percentage of fibre in the cane. On this assumption we obtain the following:—

10 per cent. of fibre	=	86.7 per cent. of juice
11 do do	=	85.3 do do
12 do do	=	84.0 do do
13 do do	=	82.7 do do
14 do do	=	81.3 do do
15 do do	=	80.0 do do
16 do do	=	78.0 do do
17 do do	=	77.3 do do

A number of experiments have demonstrated that the ordinary three-roller mill leaves in the megass from 150 to 180 parts of juice per 100 of fibre, or even more if very poor work is being done. The megass from a single mill with a cane splitter contains about 120 to 130. That coming from a train of mills consisting of a Krajewski cane crusher and two three-roller mills, in which maceration is effected, contains from 65 to 70; while the megass coming from a train of mills consisting of a Krajewski cane crusher and three three-roller mills employing maceration may be reduced to a content of 25 to 30.

If we tabulate the results which may be obtained from various systems of milling as effected on canes of different fibre contents, we obtain interesting figures:—



THE "NATAL" SPRAY PEN.—II.

Side View of the Pen.

(See "*Traffics and Discoveries.*")

Type of Milling Plant.	Juice per 100 of fibre in Megass.	Juice per 100 of cane when fibre content of cane is :—				
		10 per cent.	12 per cent.	14 per cent.	15 per cent.	16 per cent.
Bad single mill ...	200	65.7	63.0	53.3	50.0	46.7
Fair single mill ...	180	68.7	62.4	56.1	53.0	49.9
Good single mill ...	150	71.7	65.0	60.3	57.7	54.7
Cane splitter and single mill ...	130	73.7	68.4	63.1	60.5	57.9
Krajewski and two 3-roller mills with maceration ...	70	79.7	75.6	71.5	69.5	67.7
Krajewski and three 3-roller mills with maceration ...	30	83.7	80.4	77.1	75.5	73.9
Krajewski and three 3-roller mills with maceration, best work ...	25	84.2	81.0	77.8	76.2	74.7
Total juice in cane ...	0	86.7	84.0	81.3	80.0	78.7

Such a table enables us to realise at once the enormous influence exerted by the fibre of the cane upon the quantity of juice which is obtainable. Thus, a good single mill will obtain from 71.7 to 54.7 per cent. of juice according as the cane contains from 10 to 16 per cent. of fibre. The table also enables us to see at a glance the influence, on the crushing, of the perfection or imperfection of the mills employed.

In order to show the influence of the fibre in the canes, and the influence of the mill on the number of tons of cane required to make a ton of sugar, the following table has been prepared, showing the tons of cane required to make one ton of sugar from canes of different fibre contents under different milling conditions, assuming juice to contain 1.95 lb. of sucrose per gallon:—

Kind of Mill.	Fibre in Canes.		
	14 per cent.	15 per cent.	16 per cent.
Muscovado—			
Bad single mill ...	13.7	14.6	15.6
Fair single mill ...	13.0	13.7	14.6
Good single mill ...	12.1	12.5	13.3
Factory (Crystals)—			
Double crushing and Krajewski	8.8	9.1	9.3

All these figures justify the general conclusion that under conditions where $13\frac{1}{2}$ tons of canes are required to make a ton of muscovado sugar, a ton of crystals can be made in a modern factory from nine tons of canes. If the canes dealt with are of such a quality that more or less is required in one case, a corresponding amount more or less will be required in the other.

Toowoomba Canary Grass.

THE SO-CALLED "*PHALARIS COMMUTATA*."

THE following is the article referred to in the sub-leader in the present issue of the *Journal* on "*Phalaris commutata*." The article, which was written by Dr. Alfred J. Ewart, Government Botanist and Professor of Botany at the Melbourne University, appeared in the December, 1908, issue of the *Journal* of the Department of Agriculture of Victoria:—

This fodder grass has recently been largely advertised as the king of all winter grasses. It is stated to have been first introduced into Australia by Mr. R. Harding, Curator of the Botanic Gardens Toowoomba, Queensland, to whom credit is generally given for its introduction and distribution. Mr. Charles Ross, Manager of the State Farm, Westbrook, Queensland, however, informs me that it was introduced into Toowoomba over twenty years ago, when the late Mr. Way was Curator of the Botanic Gardens. The seed was received with about sixty other grasses from the Agricultural Department of New York, U.S.A. All the varieties were lost but this one, which existed in out-of-the-way places, such as hedgerows and rubbish-heaps. Mr. Harding drew Mr. Ross' attention to this grass four or five years ago and gave him a root. Recognising its value he (Mr. Ross) at once began to propagate and distribute it. Hence, as is often the case, the credit of introducing and spreading this grass is not solely due to one man but is to be apportioned amongst several.

"*Phalaris commutata*" is a native of the foothills of the Alps, and other parts of Italy. Mr. Webb, in the *Sydney Daily Telegraph*, 17th June, 1908, stated that this Italian grass was imported from America for the Toowoomba Experimental Farm in 1884, with a lot of other grasses. On account of great drought none did any good and they were thrown away on a rubbish-heap. Some years afterwards a beautiful grass was observed doing well where the roots had been thrown. This was "*Phalaris commutata*."

In the *Agricultural Gazette of New South Wales*, 1908, page 849, a number of reports from the different agricultural stations are given in regard to its utility for grazing and fodder purposes. The reports are very conflicting, but on the whole it is agreed that it grows well in winter, and up to about December, when it seeds. The stems are then rather hard, so that if it is to be used for hay it must be cut early while fresh and green. The flat, succulent leaf is readily eaten by stock, including sheep. Since the plant is not only a perennial but also seeds freely, it should maintain itself well, even under continued grazing. In any case, however, it has still to be shown that it is superior to all or any of the

fodder grasses already known and in common use. For permanent pastures it is, for instance, not certain whether it is any better than *Phalaris minor*, a well and long known species of the same genus.

For some time, the National Herbarium has been in doubt in regard to the correctness of the name given to this plant. The Kew Index makes *Phalaris commutata*, Roem. and Schult, a synonym to *Phalaris coerulescens*, and at one time it was thought possible that the plant might prove to be a cross between *Phalaris coerulescens* and *Phalaris arundinacea*. Specimens were sent to Kew Gardens, and to Professor Hackel. The Director of the Royal Botanic Gardens, Kew, writes that the plant received for identification is *Phalaris bulbosa*, L. (1755) (synonym, *Phalaris nodosa*, L. (1774)). *Phalaris commutata*, Roem. and Schult, is, according to Bertoloni, a composite species described from the base of a specimen of *Phalaris bulbosa*, and an inflorescence of *Phalaris minor*. *Phalaris bulbosa* is a well-known native of the Mediterranean region, but I can find nowhere any account of its properties or usefulness as a fodder grass, and in general the genus *Phalaris* appears to be of more value for its seed (canary seed) than for fodder or grazing purposes. In any case it is doubtful whether the grass would be a suitable one for rotation farming, so that trials in this direction should be conducted with caution. Professor Hackel writes to say that he considers the plant to be a new, undescribed species intermediate between *Phalaris bulbosa*, L. and *Phalaris arundinacea*, L. From the latter it is distinguished by the want of subterranean scaly-leaved runners, by the wing on the keel of the sterile glumes, which is, at least, 0.4 millimetres broad (in *Phalaris arundinacea* it is wanting or minute), and by the absence of the three sterile glumes, which are present in *Phalaris arundinacea*. The same character distinguishes it from *Phalaris bulbosa*, which has also much broader wings on the keel of the sterile glume and which has three to four bulbous lowest internodes of the culm. The name of "*Phalaris commutata*" was given by Roem. and Schult to a plant gathered near Genoa (Italy), and described as having a bulbous culm and the wing of the keel of the sterile glumes *denticulate* (like that of *Phalaris coerulescens* and *minor*). It is possible that *Phalaris commutata* is a synonym of *Phalaris coerulescens*, but Bertoloni says that the specimen was combined of the vegetative parts of *Phalaris bulbosa* and the inflorescence of *Phalaris minor*. Modern Italian botanists have suppressed this doubtful name.

Professor Hackel proposes to give the name of *Phalaris stenoptera* to this grass, on account of the very narrow wing on the keel of the sterile glumes. There is, therefore, a difference of opinion between two weighty authorities as to whether this grass can be referred to an existing species (*Phalaris bulbosa*) or is an entirely new one, but both agree

in suppressing the name of "*Phalaris commutata*." If Professor Hackel is correct and we are dealing with a new species, the question arises as to its origin. Its free powers of seed production point against a hybrid origin, and we have no guarantee that the seed originally imported was pure, or in fact, that the plant with which we are dealing was actually derived from the imported seed at all. The gap of four or five years between the apparent loss of the seed and the reappearance of the plant on a rubbish-heap is a big one, and gives room for many possibilities.

The conveyance of a plant of mixed affinities from one country to another by making its seed develop under varied conditions of environment is especially likely to render it liable to sudden saltatory variations, such as de Vries found capable of producing new species in *Oenothera* (the evening primrose). Whether we are dealing here also with a similar case of the sudden evolution of a new species is difficult to say and can only be determined by the cultural experiments, which Professor Hackel now has in progress. If the characters on which he relies remain constant and run true to seed, it will be difficult to avoid the conclusion that we are dealing with the sudden evolution of a new species induced in a plastic stock by the action of a pronounced change of environment.

No species of *Phalaris* are native to Australia, but we have no information as to the origin and purity of the seed originally received from the United States. In all probability it came from a number of individuals which were not all precisely alike, and possibly were in some cases strongly dissimilar. The plant which succeeded in surviving in the struggle for existence on the rubbish-heap would naturally be the strongest and best suited to extreme conditions. For the present, judgment must be suspended, but the name of "*Phalaris commutata*" must be at once suppressed, and can be replaced for popular purposes by Toowoomba Grass or Toowoomba Canary Grass, or Queensland Canary Grass, while we still need more precise information as to whether this grass is really superior to those already known and widely used for fodder and winter grazing. Old lamps are sometimes more valuable than new ones, even outside of fairy tales.

Mr. Bailey, Director of the Botanic Gardens, Brisbane, writes to say that so far he has not received authentic Queensland-grown specimens of "*Phalaris commutata*." Of two specimens received one proved to be *P. arundinacea*, the other *P. nodosa* (*P. bulbosa*). From Mr. Alexander, of Brighton, and from other correspondents, we have received plants of undoubted *Phalaris canariensis* which appeared among the crop of "*Phalaris commutata*." This is all evidence tending to show that Toowoomba Canary Grass is a mixed hybrid, which tends to revert to its parent forms. We shall be indebted to cultivators of this grass if they would note and forward for examination any abnormal plants with dif-

ferent heads to the rest which may appear among the crop. It may be possible in this way to definitely and decisively determine the real nature or origin of this grass, and whether it is (1) a variety of an existing species (*Phalaris bulbosa*, L.), (2) a double hybrid (*P. canariensis arundinacea*), or (3) a new undescribed species (*P. stenoptera* Hackel).

Science and the Farmer.

NOTES BY FARMING EXPERTS.

GOOD butter should not contain more than 10 per cent. of water and 0.7 per cent. of curd, but fault cannot be found if the former does not exceed 12 per cent. and the latter 1 per cent.—*J. C. Morton* ("The Dairy of the Farm.")

MANURING OF BARLEY.

On soft land, farm-yard manure laid on in autumn or early winter is the best application for barley for improving or stiffening the straw. The most available form in which silicates can be presented to grain crops seems to be in the decayed straw. When early sowing is followed, farm-yard manure imparts health and strength to grain crops on all inferior and soft soils.—*R. Scott Burn* ("Soils, Manures and Crops.")

THE PLANTAIN.

The plantain is one of the easiest plants in the world to grow once it has become established in a suitable position. In countries where the food is the national diet of the people the lower slopes of the hillsides are the usual places planted. The plantain likes moisture and warmth—the lee side of a kopje with shelter from the east winds, moisture from the hills, rich land to grow in, and drainage for the roots appears to be the ideal site. It should be high enough to escape the severe frosts that occur in the valleys.—*C. E. F. Allen* ("Rhodesian Agr. Journal," June, 1909.)

CALVING-TIME.

When a cow shows signs of calving, it is advisable to move her into a warm, dry and airy loose box. Assistance should be rendered at the right time—that is when the calf's feet appear—but the process should not be hurried. It is well to give nature a chance, and help it. A couple of quarts of cold water refresh a cow after the labour of parturition, and they should shortly be followed by warm oatmeal gruel. These, however, are not immediately needed, if the cow is allowed to lick the calf—a function, however, which unsettles the cow, if the calf is afterwards taken away, though good for the calf.—*Prof. J. P. Sheldon* ("The Farm and the Dairy.")

GREEN CROPS.

The most usual plan for bringing land into condition for the growth of cereals is the cultivation of green crops. These may be ploughed in, forming what is termed green manuring; or consumed on the land by the farm stock; or the crop may be removed, consumed in cattle-sheds or in the farm-yard, and the resulting manure brought on to the land. The principle in every case is that the constituents of the crop shall be returned to the soil. The consumption of the crop off the land, and the bringing back of farm-yard manure, is the most imperfect of these modes of restoration, owing to the losses which occur during the making of farm-yard manure.—*R. Warrington, M.A., F.R.S. ("The Chemistry of the Farm.")*

DUTY AND MEASUREMENT OF WATER.

In the shortage of water in order to determine the amount which can actually be conserved for useful purposes, it is necessary to ascertain the extent and the rate of evaporation under different conditions of latitude, altitude and general climate. Local conditions, character of the soil, slope of the land, cultivation, humidity, evaporation, precipitation, drainage and capillary action are so widely at variance in different localities, that there is small hope of getting any formula which will admit of extended application. Crops differ with respect to moisture requirements. For example, oats and wheat will require more than rye and barley, and buckwheat, amber cane and corn still less than the other grains.—*Lue Wilcox ("Irrigation Farming.")*

BREEDING AND PEDIGREE RECORDS.

The primary and most fundamental requirement in all breeding work, whether conducted for scientific or utilitarian purposes, is that at any stage of the work there shall be an exact knowledge of the ancestry (to as remote a degree as possible) of each of the individuals composing the breeding stock. A successful outcome of such work depends upon, among other things, an adequate system of keeping pedigree records. Not only must the pedigree records be accurate and systematic on paper, but they must also be *trustworthy*. To ensure that they shall be trustworthy it is necessary that the concrete breeding operations be carried on in such systematic fashion that errors in or contamination of the pedigrees either will not occur, or if they do occur will be at once detected. That is to say, breeding operations must be so systematised that, for example, there cannot arise in the breeder's mind any doubt that the actual parents of a given individual are the animals which he supposes to be the parents.—*Raymond Pearl and Frank M. Surface (Maine Agr. Expt. Station.)*

Farm and Garden Notes for August.

By GEO. CARTER, F.R.H.S.

CHILIAN CLOVER.

THERE is a good deal of talk in the Mooi River district about a new clover, called "Chilian," which seems to be doing remarkably well there. I saw this early in May in a piece of ground cultivated by Mr. Abbott, who was good enough to give me all information he had. He had obtained the seed under the above name in the Eastern counties of England. There can be no doubt that this little crop was worth looking at, being of very vigorous growth, and clean, nice stuff. Although the leaf seemed a very familiar one at the time I saw it, its very success in a district where most clovers cannot be said to do very well seemed to make it worth while making further enquiries. Had the plant been in flower one might have named it at once, but there was not a flower to be seen. I therefore wrote at once to several prominent English seed firms, asking them what it was that the Eastern counties farmers were growing under the name of Chilian Clover. The replies are now here, and they all agree that it is our old friend Red Clover (*Trifolium pratense*) under a new name. A great deal of Red Clover is now imported into England from Chili, hence the new name. So much for identification. The extra beauty and vigour of the plant can be accounted for by the extra tilth and manuring given by Mr. Abott to the ground where it is growing, and perhaps the plentiful rains of the autumn have a good deal to do with it. It may be very seriously doubted whether it would be possible to give a large farm area the same generous treatment as this ground has had. One cannot draw universal conclusions from such a small piece of ground. There may be something, however, in the country of origin of the seed, for it is quite conceivable that seed from Chili would more readily acclimatise here than seed grown in Europe.

ARTICHOKES AS A FARM CROP.

Farmers who intend to put in an acre or two of Jerusalem Artichokes this spring should do the work in August. This is one of those excellent weedy things which, while being very easy to grow, and suffering from no diseases, are most useful during the winter months, especially where pigs are raised. Twenty pigs can be kept going all winter on an acre of Artichokes. We have a small crop just now which, grown without any manure, is yielding at the rate of 300 sacks per acre. The culture of the Artichoke is almost the same as for potatoes. "Seed" should be put into drills three inches deep, three feet apart, and the distance in the rows two feet. We find the crop gets through much better on heavy land

at three inches deep than at even four inches, but if the land be light an inch more or less will be of very little importance. The crop grows right through the season until March, and may be dug at any time after the leaves turn brown. Tubers will not store, in Natal, out of the ground, and should never be out of the ground longer than a fortnight. The best way of reaping, if the pigs are not to do the work, is to dig just as they are required. For the second crop the same ground may be used again, but it is advisable to plough all up and replant. There are several varieties, but not one can at all equal Sutton's New White. Those who are now growing the old red skinned variety should at once change over to this, for in all points, size, shape, yield and flavour, it is by far the best.

EARLY POTATOES.

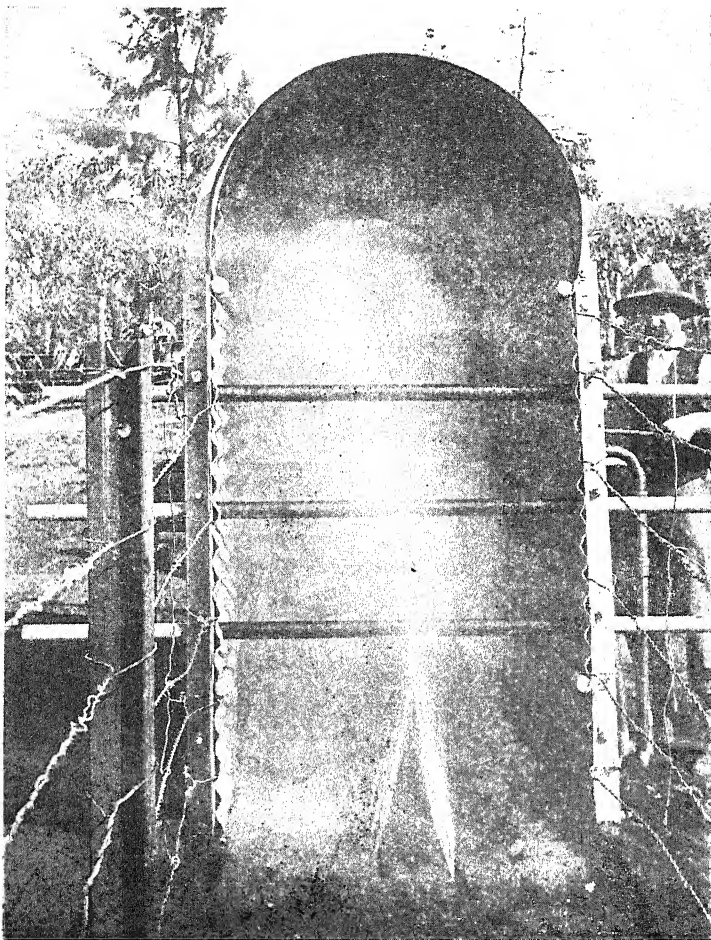
August is a favourite month for getting these in. It is unfortunate that a very early variety can scarcely be obtained, and planters must needs fall back on the second early, say, Flourball or Windsor Castle. Both these are excellent varieties, but will take fully 3½ months to mature.

The transplanting of onions sown in April should now commence.

THE VEGETABLE GARDEN.

In the colder districts gardening is still confined to a few varieties of vegetables. A good sowing of early peas should go in this month. "Yorkshire Hero" is still the safest of the marrowfat type. Early potatoes (as early a variety as can be obtained) should be planted for November use, for potatoes will be scarce then. The "seed" will not be through the ground for a fortnight, and by that time nearly all danger from frosts will be over. Summer lettuces and cabbages should be sown now, and onions transplanted. Those who omitted to sow onion seed in the autumn should sow at once, choosing a spring variety, such as "Queen," "Ailsa Craig," or "Danver's Yellow." The Neapolitan type will not do well if sown in the spring in some districts. Finish off the rhubarb planting, and get in a good sowing of leeks. Too many people sow leeks in the autumn, with the result that immediately warm weather comes in spring all the plants bolt to seed.

In the Midlands districts August is a great gardening month, for frost is over, and almost anything in the calendar may now be sown. This is the last possible month for artichokes, asparagus, shallots and rhubarb. We commence with dwarf French and runner beans. Dwarf beans should be grown systematically for home supply, so that there may be a good pulling all through the season. My plan is to sow two rows during the first week in every month throughout the season, that is from August right up to the end of February. One can seldom keep the bushes in good bearing for longer than a month, although the running varieties and some kind of "Lima" may be kept going nearly all summer by judicious picking. Take for dwarf varieties "Canadian Wonder" and



THE "NATAL" SPRAY PEN.—III.

Interior of the Pen : taken at instant of closing roof sprays and opening floor sprays.

(See "*Traffics and Discoveries.*")

"Golden Butter," two distinct types; for runners the old "Scarlet Runner" and "Advance," and put in for a trial a line each of "Soy" and "Lima."

Vegetable marrows are never quite so nice as when sown in August, and the same may be said of cucumbers. The later in the season these are sown the more likely they are to be attacked by mildew, and ruined. For an early cucumber we still like the "Early White Spine" best, and follow on with "English Prickly" or "Green Giant." There is one dainty little cucumber, called "Chamber" cucumber, which is exceedingly early, and which runs so little that it is easily grown in a box, even in a room of the house near the window. Rhubarb seed should now be sown. In a previous article I grumbled about the great tendency of the "Crimson Winter" variety to run to seed in the summer, but since then the true value of this variety has come out. We had some excellent stewed rhubarb on the table to-day (July 20th), of first-class flavour, although we have had many frosty nights recently and every variety but Crimson Winter has long ago receded into the ground. I feel quite confident that this new kind may be relied upon to be an excellent kind for at least the colder Midlands, and there is certainly no other which will yield good stalks in July without forcing. I noticed also that, whereas we always lose a great number of the older varieties by rotting off in the autumn, not a single plant of "Crimson Winter" has died out. The block we are pulling from now was sown last August, so that if you want rhubarb next winter sow the seed of this variety now.

Apart from the items mentioned above, nearly everything may be sown now. But a good general principle in gardening is to avoid growing anything in the spring which will do well in autumn and winter. Let each season have its special selection.

FLOWERS.

On the high veld the sowing of flower seeds is still limited by cold weather, but a good sowing of sweet peas and pansies should go in, and a few of the more tender annuals should be sown in boxes in some warm corner. In the Midlands the possible list of flowers is immense, and cannot be enumerated here. Sow anything, but again, do not sow those flowers which do well in autumn and winter. Spring, summer, autumn and winter flowers should be distinct types, arranged so that as many varieties as possible may be grown in your (perhaps) limited space during the year.

Cyclamen, primula and primrose should be sown now in boxes, so as to have the plants a good size for blooming next winter.

Where there is plenty of room a good effect in colour may be had by what we call "massing," that is, growing one kind of flower, or one colour of flower, in a bed by itself. For this purpose use such things as

Salvia splendens, *Begonia gracilis*, Asters, Carnations, Columbines, etc. A mixed border is both beautiful and useful, but in a large garden a full effect is never produced without at least a few masses of solid colour. It is important to get really good strains of seed for this work.

Towards the end of the month it will be time to begin dividing up the Dahlias and Cannas, as they show signs of growth. We no longer do this work all at once, as is the case of countries where the seasons are shorter. Dahlias soon wear themselves out, and are generally past their best by the end of February. It is quite easy to keep up a succession of good blooms right up to frost by planting gradually until Xmas. The bulbs will take no harm in the meantime if they are stored in a cool place on soil. Bedding Pelargoniums (ivy leaved) should be put out at the end of the month, and some newer kinds of perennial phloxes for midsummer blooming. Natal gardeners have been growing the same old varieties of Phloxes for the last twenty years, and in that time a wonderful advance has been made in this flower. Chrysanthemum cuttings may be taken at any time, and will soon root in tins or soil made up of a third each leaf mould, garden mould, and sand. If any readers would like a little more guidance in Chrysanthemum culture I will willingly send a reprint of Mr. D. C. Powell's recent lecture on this glorious flower to as many as desire one. But don't worry the Editor; send direct to me. (Box 292.)

Exchange Reviews.

WHAT OTHERS ARE THINKING AND DOING.

THE *Mark Lane Express Agricultural Journal*, in its issue of June 7th, 1909, contains a very useful article on the manuring of swedes and turnips. There is no necessity for dressing the land with large quantities of farm-yard manure. The desired object can be obtained quite well by a moderate dressing of 10 tons. The best and most economical results are produced by a small quantity of dung supplemented by artificials. The Midland Agricultural and Dairy College state, as the result of their experiments, "a small dressing of dung and artificials gives a larger crop than when dung is used alone, either in small or large quantities." Of the artificials the most important for the crop is undoubtedly phosphate of lime, and in general use farmers should give the preference to superphosphate, although on very strong soils or on land where "finger-and-toe" is prevalent basic slag can be used with advantage.

For light soils a turnip manure should contain some potash; thus the Board of Agriculture recommend the application of kainit up to 2 cwt. per acre if the land is very light. The Irish Department of Agriculture suggest the following mixture with 10 tons of dung:—1 cwt. sulphate of ammonia; 4 cwt. superphosphate, 35 per cent.; 3 cwt. kainit, which is equivalent to a dressing of 8 cwt. special manure containing about 3 per cent. of ammonia; 17 per cent. soluble phosphate; 5 per cent. potash. This is a very liberal dressing, the benefit of which would be largely seen in the following crop.

Diseases of the Udder in Cows.

The *Live Stock Journal*, in its issue of May 7th, 1909, contains a useful article pointing out the diseases which may be mistaken for tuberculosis. Perhaps one of the most common diseases to be mistaken for tuberculosis of that gland is ordinary mammitis, mastitis, or "gorget," as it is commonly termed in some localities, because, after the acute inflammatory condition has abated, there always remains more or less thickening and hardness of the affected part, and it is by no means the easy matter some people would have us believe to differentiate between thickening or a firm "lump" caused by ordinary inflammation and that produced by the action of tubercle infection; especially is this difficulty present when the thickening caused by ordinary inflammation is localised, as is generally the case when it is the result of an injury from without, such as a poke from another cow, etc. It sometimes happens, too, that ordinary inflammation is set up in an udder that is already infected with tuberculosis, so that the one condition is masked by the other, or confounded with it.

Sore teats, caused by eczematous eruptions, chaps, or cow-pox, which make the cow troublesome to milk, are often the forerunner of some udder trouble, which it is not unlikely to be mistaken for tuberculous lesions by an unpractical man. The only sure method known at the present time to detect and differentiate tuberculous lesion in the udder is by microscopic examination of the tissue itself. Even the tuberculin test cannot be relied upon in cases of udder disease to definitely diagnose the case, as it seems to be undoubted that a reaction does not necessarily occur after injection of tuberculin when there is localised tuberculous disease of the udder.

Manuring for Milk.

A recent issue of *The Dairy* contains the results of recent experiments which were carried on with the purpose of trying the results of manuring for milk. Two pieces of pasture were set aside. On one

nothing was applied, while to the other 3 cwt. of basic slag and 1 cwt. of potash salts per acre were applied. Two lots of cows as alike as could possibly be found were grazed on the plots, and their milk weighed and sampled carefully in the usual way: the result showed that the manured plot yielded 5 per cent. more than the other. The cows were then transposed on the plots, and the yield again tested, and this time the result was about 2 per cent in favour of the manuring.

The quality of the milk was tested at the same time, and it was found at the first experiment that the milk off the slag was richer than the other by 55 per cent. of butter fat: with the transposed animals it was still 21 per cent. better. The most interesting point is the effect on the richness of the milk: no one has yet been able to find that food could be made to permanently improve the quality of the milk, no matter how rich the food is, but the influence of soil seems to be something different. The lesson for the dairy farmer is to slag his pastures, and if these are on light soil to add potash salts.

Manganese and Pineapples.

The Hawaii Agricultural Experiment Station has recently issued a bulletin giving the results of experiments which were carried on for the purpose of determining the influence of manganese on the growth of pineapples. Some of the pineapple soils of Hawaii contain black spots on which pineapples do not grow successfully. The application of fertilisers and lime, in conjunction with good tillage and drainage, has not resulted in effectually overcoming the yellow appearance of the pines on black soils. These black soils contain less acidity than the red soils. There is but one important difference in the chemical composition of these soils, *viz.*, in regard to the manganese content. The black soils contain many times as much manganese as the red soil. The black colour of these areas may in part be attributed to the presence of higher oxides of manganese. There is a close connection between the degree of yellowing of the pines and the percentage of manganese in the soil. Yellow pines from soils containing a high percentage of manganese are more active oxidising agents than green plants from red soil. The yellow pines have a poor root system and contain but little chlorophyl. As yet no positive remedy for this condition has been worked out. It seems wise to try other crops on the black soil, especially since sugar-cane grows well on the black soil.

Artificial Manures and the Cotton Crop.

A useful article is contained in the March number of the *Tropical Life* on the application of artificial fertilisers to the cotton crop. However, it should be clearly understood that no absolutely hard and fast

rules can be laid down. Soils differ and climates vary, and the planter must adapt general suggestions to his own particular conditions, of which he necessarily has special knowledge.

Assuming the soil has been thoroughly prepared, the question then arises as to whether the soil contains nitrogen, phosphates, and potash in sufficient quantity; if not, they must be supplied, and in as soluble a form as possible, so that they may be available as food to the plants from the outset of their growth. The majority of the results of experiments suggest the advisability, in most cases, of supplying all these constituents, unless, of course, one or other is already present in abundance. One thing must be kept in mind, that phosphoric acid should be present or supplied in abundance, if only on account of its powers in assisting the plants to assimilate the other constituents.

The cotton plant responds promptly, liberally, and profitably to judicious fertilisation, and though cotton may be, and is, *continuously* grown with profit and without impoverishing the soil, when it is adequately fertilised with chemical manures, yet it would seem that a three years' rotation—small grain, maize, and cotton—is, perhaps, the better method. The article mentions that experience has shown that for an average soil in fairly good condition a judicious use of the three constituents will produce the best results, if applied in some such proportion as this, per acre:—Superphosphate of lime (containing at least 14 to 16 per cent. phosphoric acid), 500 lb.; nitrate of soda (in two or more applications), 200 lb.; kainit, 200 lb.

Conservation of Soil Moisture.

In an article on the conservation of soil moisture, published by *St. George's Agricultural College, Ontario*, it is pointed out that spring seeding is closely connected with this great problem of conserving soil moistures. Early seeding enables crops to use the water otherwise lost by evaporation. It may also save plant food from leaching in the drainage waters by having made use of this water in the plant economy. There is danger in too great haste in seeding, however. One might better be a little too late than too early. If too early, the plants come weak and sickly or the seed rots in the soil. The effectiveness of tillage in conserving soil moisture is greater in the spring than at almost any other time. In the spring there is invariably a wet surface exposed, and this wet surface carries water off much more rapidly than can dry soil. The farmer should aim to keep simply a dry, loose blanket of soil, which will make the effective mulch.

All mulches need not be made from soil. Some of the best and the most effective are made from manure. By applying barnyard manure as a top-dressing one obtained a physical as well as a chemical benefit from it. The seasons' rains wash the fertilising constituents into the soil, where they will be available to the plants. The refuse remaining on top makes an effective mulch for retarding evaporation. This double action of manure, when applied as top-dressing, is a strong argument for pursuing this practice and for making use of the manure-spreader, in order that the manure may be more advantageously applied.

Under-drainage is also a large factor in conserving soil moisture. It is a matter of common experience that crops on well-drained soils will withstand drought better than those on similar soils not so well drained, although the crops at the commencement of the drought were equally good. The explanation of this phenomenon is, that drainage always improves the texture of the soil. With this improved texture comes increased capacity for retaining water.

Milk Sickness.

"Milk sickness" is a rather peculiar disease which prevails in the central parts of the United States, where, at times, it occurs as an epidemic among both cattle and people. This has recently been the subject of a report by Dr. J. R. Mohler, the Chief of the Pathological Division of the Washington Bureau of Animal Industry. In this we are told that in cattle the first indication of the disease is dulness, followed by violent trembling and great weakness, which increases during the succeeding day until the animal becomes paralysed and dies. Through the ingestion of flesh, milk, or dairy products of an affected animal, the disease is transmitted to man or to another animal, and attacks produced in this way often prove fatal. In man the disease develops with marked weariness, vomiting, retching, and insatiable thirst. Respiration becomes labour, peristalsis ceases, the temperature is sub-normal, and the patient becomes apathetic. Paralysis gradually follows, and death takes place quietly without rigor mortis. Many efforts, it appears, have been made to discover the nature and cause of the disease, and many theories have been put forward. None, so far, have been generally accepted. Some investigators have held that the disease is of a micro-organismal origin; some, that it is due to auto-intoxication; while others believe that it is caused by vegetable or mineral poisons. All seem to agree, however, that the disease is limited to low, swampy, uncultivated land, and that the area of the places where it occurs is often restricted to a few acres. It also appears that when such land or pastures have been cultivated and drained, the disease disappears completely.—*Live Stock Journal*, May 14th, 1909.

White Scour.

The Farmers' Gazette, in its issue of June 12th, 1909, contains a useful article dealing with the disease of "white scour." One naturally wants a prescription for some medicine whenever anything goes wrong with the live stock, but in this case medicine is of no use once the disease has got a hold, and all efforts must be made to get clear of it by preventive disinfection and sanitation.

The calving pens or byres where the calving cows are must be thoroughly disinfected: the genital parts of a cow about to calve must be disinfected, a solution of Lysol being the best for the purpose; and above all the navel string of the newly-born calf must be tied and disinfected as soon as the calf is born, and the bleeding string must not come into contact with the floor or with the litter till it is sufficiently healed up to prevent the ingress of the fatal germs. The whole treatment is for the purpose of preventing the germs coming into contact with a bleeding wound on the calf, and therefore cleanliness and disinfection must be thoroughly carried out.

The sore shoulder in horses is usually caused by the dirty collar.

Good rich cream with a large percentage of butter-fat will keep sweet the longest.

Desirable qualities in a horse are fixed by a long line of careful selections and breeding.

It's just as poor policy to work a horse too soon after feeding as to feed too soon after working.

Among the Farmers.

THE ASSOCIATIONS DURING THE MONTH.

THE tenth annual show of the Newcastle Agricultural Society was held at Newcastle on the 24th and 25th June. The feature of the Show was the combination with the Northern Districts Poultry Club, who held their exhibition within the Showground. The President of the Society, F. A. R. Johnstone, Esq., M.L.A., in declaring the Show open, trusted that the public would excuse any deficiency there might be in the exhibits, because, on account of the stoppage of ox transport, many exhibitors were unable to send produce, etc., for the Show. The Show on both days was well attended, and, although the agricultural section was rather disappointing, the poultry was excellent.

WEENEN AGRICULTURAL SOCIETY.

ANNUAL SHOW.

The Weenen Agricultural Society were most fortunate as regards the weather for their 46th annual show, which was held at Estcourt on the 24th June. This, together with a fair collection of stock and agricultural requisites, proved to be very attractive, and there was an excellent attendance of visitors; in fact, in this respect, the Society have every reason to be congratulated. The number of entries, however, was below that of last year, owing, entirely, to the East Coast Fever restrictions, and the difficulties of transport rendered thereby. However, it must be mentioned that practically every entry was well worthy of being exhibited. The total number of entries was 472: the entries of the various sections being:—Horses, 70; sheep, 58; goats, 3; pigs, 16; poultry, 48; dogs, 23; produce, 129; roots, hay, etc., 58; manufactures, 43; agricultural implements, 2; extra exhibits, 11.

The judges were:—*Horses*: W. Henwood, J.P., P. Otto, J.P., W. Buchanan. *Sheep*: R. Abbot. *Goats*: Jno. Jewitt. *Poultry*: R. Abbot. *Dogs*: E. P. B. Arnold. *Produce, etc.*: J. C. Cope, G. Ross, F. Reed, Allan Stuart. A brief review of the various sections is appended.

Horses.—The show of horses was a good one as regards general quality; however, one would like to see more entries in the different classes. Imported stallions were the first to come into the ring, which was headed, after a somewhat lengthy scrutiny on the part of the judge, by Mr. Steffell Marais' "Sherrington" with a deal of substance, and so also was the second prize winner, "Bay Lawn," the property of Mr. P. D. Simmons. There was also a struggle in the second class: Colonial

stallion, 3 years and over, in which Mr. G. E. Blake's "Vassal" proved successful. All the winners of the remaining classes of this section were fine animals, and their owners have reason to be proud of them.

Sheep.—After the horses came (in the catalogue) the sheep, which section was provided with classes for Merino and Downs. Some first-class animals were forward; but competition was scanty, the entries being disappointingly few; with the result that the major portion of the awards fell to one or two exhibitors in each of the various classes. For instance, the Hon. H. D. Winter, M.L.A., won eight prizes out of nine for Merino, and, out of a total of eleven for Downs, Mr. R. Garland secured six, while the remainder fell to Mr. G. Hutchinson. It was a pity there was not a stronger entry in this section, considering the marked importance of this particular class of stock in the Weenen district.

Goats.—This section was exceptionally poor, there being only two sections, and, worse still, a meagre total of three entries.

Pigs.—In this section also the prizes fell into very few hands; however, the quality was good and the animals well deserved their awards.

Poultry.—This section was perhaps the feature of the show. Some very fine birds were exhibited, and all the prize-winners were most deserving. Mr. T. Hindle was very prominent, securing 12 out of a total of 22 prizes. The remainder of the awards were exceedingly well distributed, no other exhibitor securing more than two.

Miscellaneous.—It is most encouraging to learn what great strides have been made in agriculture in the Weenen district, as was proved by some of the exhibits which were to be seen on the show. It must be said that mealies and Kafir corn were in all probability the most perfect which have ever been seen in the Weenen district. Some first-class oats and millet were also shown. The butter and eggs were a vast improvement on what were exhibited on the previous shows, and so also were most of the remaining articles of the *Produce, Roots, Hay, etc.*, and *Manufactures* sections.

CAMPERDOWN SHOW.

The fifth Annual Show of the Camperdown Agricultural Society, which was held at Camperdown on 23rd June, must be voted a thorough success. The attendance of the Camperdown people and visitors from the neighbouring centres was quite a record. Since the formation of the Society, Camperdown has always been well to the front with its agricultural shows, and it was agreed on all sides that this year's show surpassed all previous events. The entries totalled over 800, there being an increase of about 150 over that of last year.

The Show was opened at noon by Mr. E. W. Evans, of Durban, who,

in the course of his speech, congratulated the Camperdown people on this year's splendid exhibits. He remarked upon the all-round excellence of the produce sections. The Show he regarded as the best country show he had seen in Natal, and he was speaking with 25 years' experience. The Agricultural Society of Camperdown had justified its establishment. Mr. Evans emphasised the necessity for growing greater quantities of mealies now that the quality was well up to the standard of excellence. They had to inaugurate a prize system of mealie seed growing as was done in other parts of the world, in order to grow only from the very finest specimens. He urged upon farmers to compete for the prizes which the Government were offering for tree-planting, which was one of the most important things in the Colony. He referred to East Coast Fever, and said that it was hoped that under Union an effort would be made to stamp out the disease entirely.

Camperdown boasts, and justly so, of its splendid mealie production, and the exhibits in this direction were not only varied, but of superlative quality. In fact, the judges in this section experienced a deal of difficulty in arriving at their decisions. The show of horses was a good one; so also was that of dogs. It was in the produce sections that the Show was able to lay claim to the boast of being second to none in the districts. The potatoes shown were of good quality, all the bags decorated with prize tickets proving the worth of the Safco fertilizer. The show of beans was a splendid one. The pastry, cakes, home-made bread, jams, preserved fruits, jellies and chutneys were adjudged by experienced men to make the best exhibition of the kind seen anywhere in Natal. Some of these exhibits were even superior to those which were seen at the City or Durban show.

Messrs. North & Sons had a fine display of farming and agricultural implements on show, some of which attracted the very close attention of farmers, viz., "The Columbian Plough," which plough has carried off thirteen first prizes; the "New Deere" mealie planter, which is now fitted with special Hickory King seed attachment, with the edge-drop pattern plates in place of the round hole; "The Canadian Wonder," the "Het Volk," and the special "Rex cream separator.

JUDGES.

Horses: F. G. Burchell and H. J. Stirton. *Sheep and Goats:* J. W. T. Marwick. *Pigs:* J. W. T. Marwick. *Poultry:* H. Jones-Ikin. *Cereals:* C. E. H. Thrash. *Produce:* Geo. Carter, C. E. Thrash, J.P., and H. Baker. *Implements:* H. Baker. *Dogs:* A. J. Peters. *Manufactures:* A. N. Kirkman, J.P. *Preserves, etc.:* S. E. Holman. *Butter and Lard:* A. Lawrence.

Coal and Labour Return.

Return of Coal raised and Labour employed at the Natal Collieries for the month of June, 1909 :—

COLLIERY	Average Labour Employed.					Output. Tons. Cwt.
	Productive Work.			Unproductive Work.*	Total.	
	Above Ground	Below Ground.	Total.			
Natal Navigation ..	363	575	938	20	958	20,483 1
Elandslaagte ..	256	523	779	16	795	13,300 9
South African ..	112	271	406	65	471	11,333 0
Glencoe (Natal) ..	167	376	543	41	584	11,231 19
Dundee Coal Co. ..	296	463	759	—	759	11, 65 7
Natal Cambrian ..	217	356	563	5	568	10,727 11
Talana ..	141	407	548	9	557	8 870 0
St. George's ..	175	310	515	5	520	7,921 0
Durban Navigation ..	192	399	582	—	582	7,844 0
Newcastle ..	85	395	481	—	481	6,660 14
Hlobane ..	93	249	333	32	370	5,212 15
Natal Steam Coal Co. ..	78	187	265	15	280	4,546 4
Ramsay ..	80	151	240	11	251	3,613 7
West Lennoxton ..	56	89	136	—	136	1,617 2
Bullengate ..	47	62	109	36	145	1,217 8
Hatting Spruit ..	66	91	157	—	157	1,120 8
Central ..	25	41	66	—	66	973 14
Vryheid † ..	3	5	8	—	8	12 0
Dundee Coal Co. B'rside ..	—	—	—	199	199	8 0
Nootge-lacht ..	2	3	5	—	5	6 0
Vaalbank † ..	—	3	3	3	6	4 6
Makatees Kop † ..	3	—	3	—	3	3 10
Totals ..	2,461	4,983	7,444	457	7,901	127,798 9
Corresponding month, '08	2,284	6,013	8,297	972	9,269	126,717 14

* Cost Charged to Capital Account.

† May Returns.

CHAS. J. GRAY,

Mines Department, Maritzburg, 9th July, 1909.

Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal bunkered and exported from the Port of Durban for the month of June, 1909 :—

	Tons. Cwt.	
Bunker Coal ..	51,607	3
Coal Exported ..	24,123	8
Total ..	76,030	1

Customs House, Port Natal,
1st July, 1909.

GEO. MAYSTON,

Collector of Customs.

Meteorological Returns.

Meteorological Observations taken at Govt. Stations for Month of June, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.).				RAINFALL (IN INCHES).					
	Means for Month.		Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain-fall in 1 day.		Total for Year from July 1st, 1908.	Total for same period from July 1st, 1907.
	Maximum	Minimum					Fall.	Day.		
Observatory ..	74.7	55.8	80.8	51.5	2.56	4	2.56	5th	41.95	45.57
Stanger ..	75.8	54.1	84	50	.41	2	.41	0th	41.01	46.39
Vernham ..	78.2	50*	87	47	.34	1	.34	24th	37.64	42.33
Greytown ..	69.1	39*	76	31	Nil	—	—	—	44.83	41.33
Newcastle ..	72.5	32.7	78	26	Nil	—	—	—	—	41.68
Imbizana ..	76.8	52.8	88	45	.06	2	.04	25th	39.97	49.04
Estcourt ..	69.8	32.2	76	27	Nil	—	—	—	31.99	29.14
Bulwer ..	—	—	—	—	.01	2	.1	23 h	53.59	48.41
Ixopo ..	—	—	—	—	Nil	—	—	—	33.15	—
Umbogintwin ..	75.4	49.4	82	44	1.19	3	1.09	25th	40.69	46.90
Port Shepstone ..	8.95	53.1	87	50	.44	1	.34	18th	46.31	49.42
Umzinto ..	—	45.3	—	42	.76	2	.73	24th	55.54	42.49
Richmond ..	72.4	43.9	78	37	.02	1	.02	14th	37.69	36.16
Mariuzburg ..	75.8	41.4	85	37	Nil	—	—	—	40.59	38.80
Howick ..	70.3	37.3	78	32	Nil	—	—	—	—	—
Ladysmith ..	75.6	37.2	82	33	Nil	—	—	—	—	—
Dundee ..	68.5	41.5	76	39	Nil	—	—	—	39.63	31.27
Weene, Gaol ..	77.2	32.7	81	29	Nil	—	—	—	44.83	29.32
Mid-Illovo ..	72.8	50.0	85	44	Nil	—	—	—	44.12	42.69
Krantzkloof ..	74.8	54.4	84	48	.06	1	.06	25th	42.85	—
New Hanover ..	74.6	40.4	78	30	Nil	—	—	—	33.06	42.33
Cam. erdown ..	79.4	48.2	86	44	Nil	—	—	—	29.45	29.11
Krantzkop ..	67.0	43.9	3	37	Nil	—	—	—	35.68	—
Nongoma ..	68.7	46.2	76	42	.10	3	.04	11 & 12	—	—
Charlestown ..	64.2	30.9	69	24	Nil	—	—	—	45.41	31.31
V. yheid ..	71.5	41.3	81	39	Nil	—	—	—	—	38.48
Nqutu ..	65.2	43.0	70	38	Nil	—	—	—	37.43	—
Hlabisa ..	77.2	56.2	82	52	.30	1	.30	29th	47.58	34.22
M. Inoth ..	71.4	50.1	79	46	.15	2	.11	11th	31.12	28.20
Ubo ubo ..	63.6	54.1	5	51	.18	1	.18	12th	42.37	35.49
Point ..	—	—	—	—	.42	5	.36	4th	44.91	55.69
Lidgerton ..	74.2	33.4	88	28	Nil	—	—	—	13.38	—
Nottingham Rd ..	66.0	26.3	72	19	Nil	—	—	—	—	—
Mahlabi ini ..	79.1	42.1	82	26	Nil	—	—	—	32.64	23.94
Rmpangeni ..	76.0	51.5	81	42	.03	2	.47	29th	45.63	40.16
Mtunzini ..	76.0	51.7	—	50	.51	2	.39	25th	72.74	51.94

Meteorological Observations taken at Private Stations for Month of June, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.)		RAINFALL (IN INCHES).					
	Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain-fall in 1 day.		Total for Year from 1st July, 1908.	Total for same period from July 1st, 1907.
					Fall.	Day.		
Adamshurst ..	79	37	0.00	0	0.00	—	—	—
Hilton ..	78	41	0.02	1	0.02	14th	43.32	37.29
P. M.B., Botanical Gardens ..	—	—	—	—	—	—	—	—
Ottawa ..	—	—	0.65	1	0.65	25th	33.09	42.47
Equeseta ..	81	52	0.70	2	0.53	25 h	43.06	47.84
Umzinto, Beneva ..	—	—	0.28	2	0.27	23rd	41.33	52.61
Umhlangeni ..	—	—	0.33	1	0.03	23rd	41.53	—
Reit V ei ..	—	—	—	—	—	—	—	—
Bransholme ..	—	—	00	0	.00	—	64.19	66.06
Cedara—Hill Station ..	75	38	.00	0	.00	—	—	—
„ Vlei Station ..	76	21	.00	0	.00	—	—	—
Winkel Spruit ..	89	49.5	3.71	3	3.68	24th	46.76	48.19
Weenen ..	75	24	.00	0	.00	—	—	—
Giant's Castle ..	65.3	6.6	.00	0	.00	—	49.23	49.58

Return of Farms at Present under Licence for Lung-sickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Crow	Ladysmith	Scab	J. A. Good	Matiwana Hoek
			J. de Waal	Lombard
			W. Wright	Maggiesd
			W. M. G. Bowers	Zieberg
			E. Moreland	Leit Kuil
			Mrs. M. J. v d Merwe	Coofontein
			Natives	Roosboom
			Natives	Faurie's Kraal
			H. Raath	Putteni Spruit
A. B. Koe	Portion of Estcourt		T. J. M. Buys	Reuit Kuil
			C. Blacker	Rietfontein
A. C. Williams	Utrecht		J. R. van der Merwe	Welgekezen
			Jan	Kromelenboog
			Umlumbo	Twyf liontein
			Umtellen	Do.
			Unisloeta	Klipspruit
			W. Kruger	Goei Geloof
			Natives	Veeltkop
			Natives	Klipfontein
			Natives	Quaggsdrift
			Natives	Groot Vlei
			Mrs. R. P. Spies	Goede Hoop
			Natives	Onverwacht
			Natives	Groot Vlei
			Natives	Sandspruit
H. Van Rooyen	Balanango		G. Haines	De Waal
			Sloekwana	Haitstogd
			Natives	Hartstogd
			C. van Rooyen and Natives	Vriendschap
L. Trenor	Alfred	Lung-sickness	Natives	Evergreen
		Scab	Sulwana	Location
			Yalwayo	"
			Dumas	"
		Lung-sickness	Uyimbi	"
			M. Clothier	Slexcel
			E. M. Etheridge	Selhurst
			John Ryan	Norburg
			J. J. Oosthuis	The Gorge
			J. H. Payn	Burnside
			Byela's Kraal	T. Lynn's Location
			F. Mzizi	Lot 1, Enquabeni
			E. Mzizi	Lot "F," Enquabeni
			J. T. Clothier	Whitelcliff
			Swenyas	Blackwater
			G. Larkan	Antioch
			Injongaved	Rydal Mount
			C. Knox	Knoxwood
			Sigumu	Lot F
			Ndhlangunzie's Kr	Location
			Noganes	Harding Gate
			Mncanasa Kraal	Mount Pleasant
			Bodhlaginis	No. 1 Location
			Mqnnansla	Omega
			Spingaan	Hawarden
			Jabula and Sonjela	Mount Pleasant
		Scab	Incab	Location
			Makerlu	"
J. Ralfe	Lion's River		W. M. Henderson	Hilton
			Smith & Braithwaite	Loskop
C. T. Vaughan	Paulpietersburg		P. Allen	Welverdiend
			P. Marais	Maketeeskop
			L. Moolman	Roopoot
			H. Potgieter	Maketeeskop
			G. Combrink	Geluk
			J. H. Landman	Schiekhoek
			T. Uys	Morgenzon
			C. J. Combrink	Kuilspruit
			C. J. van Rooyen	Jachtpaan
			A. Herbst	Schikhoek
			A. Kusel	Jachtdrift
			J. C. Boshoff	Dordrecht

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
C. T. Vaughan ..	Paulpietersburg ..	Scab	P. van Rooyen ..	Leliefontein
		"	D. Grezel ..	Spilhoek
		"	E. Dodds ..	Jachtdrift
R. Wingfield Stratford ..	Newcastle ..	"	C. M. vuga ..	Koppie Allen
		"	C. J. Kaap ..	The Nek
		"	M. Worth ..	Bernard
		"	M. Morison ..	Lepard Eloff
		"	W. Osborn ..	Boshoeck
		"	Rapane ..	Walmesley
		"	W. Moller ..	Mardenash
		"	W. Steel ..	Botha's Pass
		"	T. Ball ..	Ruston
		"	A. P. de Jager ..	One Tree Hill
		"	H. O. Eksteen ..	De Weststroom
		"	Natives ..	Stalkrantz
		"	H. Hamilton ..	Glendale
C. E. Walker ..	Portion of Estcourt	"	S. W. Reynolds ..	Town Lands
		"	Oates, W. E. ..	Oatsdale
		"	Mrs. J. H. Wallace ..	Cliffdale
		"	A. Stuart ..	Glen Stuart
G. Daniell ..	Vryheid ..	"	Natives ..	"
		"	W. F. Hein ..	Gedeloof
		"	Mrs Heynes ..	Brakpan
		"	Manqulu ..	Hardetana
		"	Mkelegena ..	"
		"	Mzinzi ..	Groenkok
		"	Kuyeze ..	Mooiplaat
		"	Jantje ..	Trado
		"	Sgnangene ..	"
		"	Velapi Zondi ..	Bedrog
		"	A. Zitu ..	Mooiplaats
		"	Mk tshwa ..	Vergelegen
		"	W. Labuschagne ..	Welfrededen
		"	Mt. ben ..	Kambula
		"	E. E. Dalton ..	Bethel
		"	P. Labuschagne ..	"
		"	L. Botha ..	Waterfall
		"	J. B. Thompson ..	Noortverwacht
		"	E. Potgieter ..	Someweld
		"	Natives ..	Nooitgedacht
		"	" ..	Rut-plaats
		"	" ..	Berlin
		"	J. H. Gunter ..	Palmietfontein
		"	Natives ..	Wagondrift
		"	" ..	Prado
		"	" ..	Bedrog
		"	" ..	Vlei-plaats
		"	T. Curtis ..	Sandhurst
		"	Natives ..	Dugeraad
		"	" ..	Rustenburg
		"	Mrs B. Webbe ..	"
		"	C. Beneke ..	Langkranz
		"	M. v d Westhuizen ..	Valkoppe
		"	Natives ..	Cranstoot
		"	" ..	Prado
J. R. Cooper ..	Nkandhla & Nqutu	"	Nedde Biyela ..	Mpanthleni
		"	Mgele Biyela ..	"
		"	Natives ..	Engazini
		"	" ..	Mkonjama
		"	" ..	Macebo
		"	" ..	Selutshana
		"	" ..	Nqutu
		"	" ..	Telezi
E. Vart ..	Western Umvoti ..	"	D. C. S. Nel ..	Highfield
		"	H. Hansmeyer ..	Onres
J. F. van Rensburg ..	Ngotshe ..	"	A. J. Swart ..	Reilfontein
		"	P. J. van Vureu ..	Driefontein
		"	C. S. Fouche ..	Kondelage
		"	Mjanja ..	"
		"	Natives ..	Langervacht
		"	F. M. Borthwick ..	Mooi Vlei
		"	Natives ..	Mooklip
		"	C. J. Vermaak ..	Groenogden
		"	J. A. Schultz ..	Onvewacht
J. Stewart ..	Bergville ..	Lungsickness	J. C. Emmett ..	Gondhoek
		"	O. Zunckel ..	Rustenburg

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
E. W. Larkan	Umsinga	Scab	Amos Nah'ovu	Nazareth
			Oyunglangans	Umsinga
			Tabatulu	Nazareth
			Avon Mlodu	Grootvlei
			Mkerenis	Gordon Memorial
			Nyoniaewye	Mazabap
			George	Gordon Memorial
			Bilana	Ndayance
			Tshantulu	Umsinga
			Suseulu	"
			Ng ngola & Somseu	"
			Nthubusu	Gordon Memorial
			Movenwa	Umsinga
			Sandhlwana	"
			Nyamams	"
			Amos	"
			Poposa	"
			Natives	Location
			"	Gordon Memorial
			"	Vaalkop
R. Mayne	Eastern Umvoti & Krantzkop	"	T. H. Delekind	Harding
			J. A. Nel	Veligund
			J. T. Martins & ntvs	Brodershoek
			Mucal gaul	Loots Hoek
			C. H. Havemann	Summerford
			Natives	Umbuba
			"	urleigh
			J. P. C. Nel	Spitzkop
			W. Turpin	Olivefontein
			J. C. Nel	Spitzkop
E. W. Bowles	Irepe	"	Bogwan	Arundel
			Nduba	Waverley
			Makafana	"
			Njoyeta'a	Lot 29
			Gungatshi	Location No. 3
			G. H. Cooper	Avetary
			D. E. Hardman	Ellington
			Mandemba	Lot D.U.
			Tebenga	"
			E. F. Garland	Springvale
			E. W. Veley	Ay horpe
			Gangadene	Coolhill
			Solabamba	Gorton
			Godhloza	"
			J. Johnson	Vlei Cottage
			Bobejana	Lot K of 5
			Mangatshu	McKenzie
			Boreni	Smithfield
A. H. Ball	Weenen..	"	Koyesa	McKenzie
			G. Smith	Smithfield
			J. P. Lotter	Berg Vleijt
			P. H. Van Rooven	Buffels Hoek
			P. P. van Rooyen	Doornkloof
			P. J. van Rooyen	Middleburg
			G. J. v d W's huizen	Winterhoek
			G. J. v d Westhuizen	"
			Naude & Lotter	Scottshoek
			J. T. van Rooyen	Belle Vue
F. Kruger (acting)..	City, Urgeni	"	Mrs. Hair & Sons	Oribi Vlake
			Natives	Oribefontein
			"	Scottshoek
			"	Scottspoot
			Umvelli	Zwaartkop Location
			Dria	"
			Samuel	"
			Janlje	"
			Laduma	"
			L. Taylor	"
A. J. Marshall	Dundee	"	Ramen	Ellis' Estate
			J. Henwood	Hilton Road
			A. C. Vermaak	Sigtuna
			T. C. Vermaak	Harrisdale
			J. W. de Bryn	Rooifontein
			B. J. Badenhorst	Kem' enveldt
			L. Badenhorst	Kelvin
			H. A. J. Davel	Kliprug
			C. T. Vermaak	Kalderfontein
			H. P. Handley	Giba
			D. C. Uys	Parys

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE	OWNER.	FARM.
A. J. Marshall ..	Dundee ..	Scab	Honeywill & Taylor	Rietbokspruit
		..	Havvey & Retallach	Slerkstroom
		..	Natives ..	Conle ford
		..	.. ..	Ruigtefontein
		..	A. A. Turton ..	Dundee Town Lands
B. Klusener ..	Lower Umzinkulu.	Lungsickness	McKenzie & Kruger	Dabray
			Nyapu ..	Berbeck

MANGE IN HORSES EXISTS AS UNDER

Owner.	Farm.	District.
Pinda, Vete & Sobuon ..	Strathsoon	Impendhle
Natives ..	Olivefonte	Umvot
Natives ..	Tetworth	Lion's River

Pound Notices.

NOTIFICATION is contained in the *Government Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :

ON THE 4TH AUGUST.

Donnybrook—Black ewe goat ; black and white goat with kid. All impounded on the 6th June, 1909, by H. Harris, Colbeck Farm.

Pine Tree Pound, Alexandra—Four black ewe Kafir goats and one black kid ; two brown ewe Kafir goats and one brown kid. Impounded by M. Blamey, Clifton Park, Isipofu.

Utrecht—Grey mare, 8 years old, height about 14 hands, lump above each eye, no visible brands ; chestnut gelding, about 8 years old, height 14 hands, cut mark left ear, white saddle marks, no visible brands.

Muden, Weenen—Black she goat, no marks ; black kid, no marks.

Good Hope, Klip River—Two Merino sheep ewes, one branded I-H, one branded S-O.

Halting Spruit, Dundee—Brown gelding, aged, black points, near hind foot white, brand indistinct, look, like AM, or may be M.

Howick—Running on the farm "Yarrow," and reported by Mr George Trotter as being too wild to catch to send to the Pound : Bay mare, long mane and tail, about 14.2, poor condition, no brands visible.

Inhlazatje, Vryheid—Three black Kafir sheep, ewes ; two black Kafir sheep, ewes, white spot on head ; red-coloured Kafir sheep, ewe ; young black-and-white sheep, ewe, no ears ; young red-and-white sheep, ewe ; red-coloured sheep, ewe, long tail ; three black-and-white lambs ; black lamb, various ear marks.

ON THE 1ST SEPTEMBER.

Donnybrook—Bay mare, 13 hands, white star (faint), long tail and mane, no brand, very old, poor condition ; ewe goat, chestnut.

Mooi River—Black sow pig, in fair condition, no marks.

Vryheid—On the farm of Sobantu, at the Vleiplaats Kraal, on 15th July, amongst a lot of sheep at present under license, so cannot be brought to the Pound : three stray Merino hamels, brand I-L, also ear marks.

Government Cold Stores and Abattoirs.**PIETERMARITZBURG.**

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

	Calves up to One Year old.	Cattle over One Year old.	For minimum number of 250 head per month.		For maximum number of 500 head per month.	
			Under 300 lbs. weight.	Over 300 lbs. weight.	Under 300 lbs. weight.	Over 300 lbs. weight.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1. Receiving per head	0 3	0 6	0 6	0 6	0 3	0 3
2. Killing and Cleaning "	2 3	3 6	2 9	3 3	2 6	3 0
3. Labour "	0 3	0 6	0 3	0 6	0 3	0 6
4. Disinfectants "	0 1	0 1	0 1	0 1	0 1	0 1
5. Bagging (4 Quarters) per body	1 9	3 0	2 6	2 9	2 3	2 6
6. Cleaning of Tripes each	0 6	0 6	0 6	0 6	0 6	0 6
7. Chilling of Beef, up to 72 hours or portion thereof per body	1 0	2 9	2 0	2 6	1 9	2 6
8. Chilling of Offal, up to 72 hours or portion thereof per set	1 0	1 0	1 0	1 0	1 0	1 0
Chilling and Freezing Beef—						
9. 1st week or portion thereof per body	2 0	4 6	3 9	4 0	3 6	3 9
10. 2nd " " " " " "	1 0	4 0	3 3	3 6	3 3	3 3
11. 3rd and remaining weeks or portions thereof "	0 8	3 0	3 0	3 0	3 0	3 0
Chilling and Freezing Offal—						
12. 1st week or portion thereof per set	1 4	1 6	1 4	1 4	1 4	1 4
13. 2nd " " " " " "	1 0	1 3	1 0	1 0	1 0	1 0
14. 3rd and remaining weeks or portions thereof "	0 9	1 0	0 9	0 9	0 9	0 9

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg,

21st December, 1908.

Farm Apprentices' Bureau.

LIST OF APPLICANTS.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | | |
|-----|-----|---------|--|
| No. | 2. | Age 15. | Has had 18 months' experience of farming. Understands more about forestry than general farming. Speaks Zulu, and understands Dutch. |
| „ | 3. | Age 24. | Colonial born Has a knowledge of bookkeeping. |
| „ | 4. | Age 18. | Natal born. Anxious to learn farming. |
| „ | 5. | Age 24. | Speaks Zulu. Keenly interested in farming. |
| „ | 6. | Age 17. | Still at school. Speaks French fluently, and has a fair knowledge of German and Dutch. Is very well educated. Particularly anxious to learn farming. |
| „ | 11. | Age 18. | Has had two years' experience on a sheep farm in the O.R. Colony. Is particularly anxious to get back on a farm. Is very willing and obedient. |
| „ | 13. | Age 20. | Is an orphan. Is anxious to learn farming. |
| „ | 14. | Age 16. | Natal born. |
| „ | 15. | Age 19. | Is desirous of learning farming. |
| „ | 17. | Age 20. | Speaks Zulu. Is keenly interested in farming. |
| „ | 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. |
| „ | 26. | Age 18. | Has a knowledge of Zulu. Was brought up in a farming district in Scotland. |
| „ | 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. |
| „ | 29. | Age 15. | Has had experience on a stock and on a mixed farm. Speaks Zulu. Is a good horseman. Is anxious to get on a farm. |
| „ | 30. | Age 18. | Transvaal born Has had experience on a mixed farm. Speaks Dutch and Zulu. |
| „ | 31. | Age 20. | Has a knowledge of engineering and carpentry. Is a Natalian. Anxious to learn. |
| „ | 32. | Age 15. | Has lived on a farm for some years. Speaks Dutch and Zulu fluently. Is very intelligent. |
| „ | 33. | Age 16. | Well educated. Speaks Dutch and Zulu. |
| „ | 34. | Age 18. | Has a slight knowledge of Zulu. Understands carpentry. |

Agricultural and Other Shows, 1909.

GREYTOWN (Umvoti Agricultural Society).—Date not fixed. W. H. Gibbs, Box 24, Greytown, *Secretary*.

LADYSMITH (Klip River Agricultural Society).—Date not fixed. E. V. Bambrick, Box 90, Ladysmith, *Secretary*.

SOCIETIES HOLDING NO SHOWS.

Byrne Farmers' Association; Eshowe District Farmers' Association; Richmond Road Farmers' Association; Donnybrook Farmers' Association; Ladysmith Farmers' Association; Hatting Spruit Farmers' Association; Boston Farmers' Association; Little Tugela Farmers' Association; Umvoti Farmers' Association; Highflats Farmers' Club; Vryheid Agricultural Society; Garden Castle Farmers' Association; Nottingham Road Farmers' Association; Seven Oaks Farmers' Association; Richmond Agricultural Society; Slangrivier Boeren Vereeniging; Ingogo Farmers' Association; Frere Farmers' Association; Dronk Vlei Farmers' Association; Lower Tugela Division Association; Umsinga Biggarsberg Farmers' Association; Ixopo Farmers' Association; Bergville Farmers' Association; Mid-Illovo Farmers' Club; Upper Biggarsberg Farmers' Association.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 115.—Englishman, 26 years of age, steady and an abstainer, with a knowledge of cattle and horses, wishes employment on a farm in Natal (English preferred) as a handy man, with a view to furthering his knowledge of farming in this country. Is willing to accept food and clothing in a good home, for services, for a few months with the prospect of a small wage after the first three months.

No. 116.—Cape man, age 32 years; married, no children. Has been used to working with horses and mules all his life. Has good papers from his previous employers, and was in the employ of the Public Works Department for over five years. Is willing to do anything in his power, but cannot read nor write.

No. 117.—Englishman, 25, of good education, desires appointment as overseer on a plantation in Natal, and would pay a reasonable premium and give services free for a few months if necessary. Has had commercial, engineering, surveying and mining experience.

No. 118.—Pensioner from the Army desires to obtain post on a farm. Is particularly fond of gardening. Has excellent discharge papers and good testimonials.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 121.—Desires open air employment. Age 43. Life experience of agricultural pedigree and prize stock gained in Scotland. Has been six years in South Africa. First-class references and testimonials. Small salary required.

No. 122.—A young man, with life-long experience of cane-growing, desires employment as manager or overseer on a plantation. Experience has been in Queensland and Fiji. Is good at figures and capable of taking charge of books if necessary.

No. 123.—Married man, 35 years of age, with 5 years' experience on poultry and stock farm in California, wishes to get on to a farm in Natal. His wife is a good cook and handy in dairy. Would be willing to work for a very small wage or for their keep for a period of twelve months at least, after which they would expect some remuneration. Can produce first class personal references.

FARM ASSISTANCE REQUIRED.

A well-known farmer and wattle grower requires young man to assist manager of his farm at Hilton Road. Experience in farming a qualification. Applicant must be one who has had fair education and who could manage correspondence. Apply by letter, stating previous experience (if any), age and salary required.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

MAIZE SEED.

Growers who may have for sale selected seed of the following types of maize are invited to communicate as early as possible with the Director, Cedara:—Horse Tooth, Hickory King, Boone County, Golden King and Yellow Dent.

POULTRY.

Orders will be received for selected cockerels of the following breeds for immediate delivery:—Buff Orpingtons, White Minorcas, Silver Wyandottes and Plymouth Rocks,

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

DEVON BULLS.

Offers are invited for three young South Down bulls, by imported bull, "Star of the West." Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible:—

Admittance of Students to the School of Agriculture.—House Master, Cedara.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown

Forests.—Chief Forest Officer, Ixopo.

Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.

Agricultural Seeds, etc., for Irrigation Farming.—Curator, Government Station, Weenen.

Fruit.—Orchardist, Cedara.

Accounting Business.—Accounting Clerk, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry,
Cedara.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Executives of Farmers' Associations.

** * The Editor will be obliged if the Secretaries of Farmers' Associations and similar institutions will kindly keep him advised with regard to changes in the personnel of their Executives.*

ALEXANDRA AGRICULTURAL AND HORTICULTURAL ASSOCIATION.—President: Wm Thompson. Hon Vice-Presidents: A Blamey, E W Hawksworth, Thos Kirkman, H Basley, J L Knight, R.M. Hon Secretary and Treasurer: Geo Lamb. Hon. Auditor: W B Brunner. Committee: W Arnott, H G Arbuthnot, R C Archibald, R G Archibald, J Bazley, A Behrmann, W Cooke, G J Crookes, R Cruickshank, H D Hawksworth, H E Hawksworth, A F W Hawksworth, R C Hawksworth, J Landers, D McAndrew, F Nelson, C A Preston, Dr. Rouillard, W A Gilbert, Fred Blamey, Rev B M Ford, S C Hawksworth, J C Landers, S F Crookes, J J Crookes, R A Lindsay, J A Curle, F B Preston, R Parkin, H Reynolds, J B Stewart, C Taylor, H H P Waller, J Ross, Rev W C Wilcox, Dr W P Tritton.

ALFRED COUNTY FARMERS' ASSOCIATION.—President: A G Prentice, J.P. Vice-Presidents: C Knox, J.P., L T Trenor, and C A Holwell. Hon. Secretary and Treasurer: H C Hitchins. Committee: C M Etheridge, R Fann, J.P., V Hitchins, S Aitchison, J.P., W B Rethman, Dr Case, J.P., H Rethman, R G Mack, J Hogg.

BOSTON FARMERS' ASSOCIATION.—President: Thos. Fleming, J.P. Vice-President: T. W. Rudland. Hon. Secretary: W. J. Fly, J.P. Hon. Treasurer: H. A. Phipson.

CAMPERDOWN AGRICULTURAL SOCIETY.—President: John Moon, J.P. Vice-Presidents: J Gavin and John W Harvey, J.P. Hon Secretary: W E Allsopp.

CAMPERDOWN AND DISTRICT FARMERS' ASSOCIATION.—President: John Moon, J.P. Vice-President: F N Meyer. Hon Secretary: J Baker. Committee: H Baker, J Gavin, J W Harvey, J.P., W B Turner, H H Hutton, C Baker, H E Meyer.

CHARLESTOWN FARMERS' ASSOCIATION.—President: Johannes Vos. Vice-President: — Adendorff. Secretary: W. J. Curnow. Treasurer: J. O. Thomas. Committee: H. O. Eksteen, J. P. Vos, J. C. Uys, W. G. Thomas, D. Doyer, F. A. R. Johnstone, M.L.A., G. E. Lane, S. R. Higgins, B. F. Johnstone, A. J. Johnstone, J. J. Eksteen, R. H. Greaves, Peter Thompson, G. McArthur, and V. B. van Rooyen.

DRONK VLEI FARMERS' ASSOCIATION.—President: Capt Perceval. Vice-President: Alban Hodson. Hon Secretary and Treasurer: Edward Marriott.

DUNDEE AGRICULTURAL SOCIETY.—President: T. P. Smith. Vice-Presidents: The Minister of Agriculture, the Mayor of Dundee, Messrs. A. L. Jansen, F. Thurton, and W. Craig. Hon. Secretary and Treasurer: J. McKenzie. Committee: A. W. Smallie, W. J. H. Muller, G. M. de Waal, B. J. Humann, R. Retallack, H. Ryley, H. J. Head, C. T. Vermaak, H. P. Walker, J. Dyson, H. Wiltshire, J. Campbell, H. Greenhough, D. W. H. Tandy.

DURBAN AND COAST SOCIETY OF AGRICULTURE AND INDUSTRY.—President: E. W. Evans. Vice-Presidents: Sir B. W. Greenacre, A. M. Campbell, Hon. Marshall Campbell, M.L.C., W. Adams, Frank Stevens, C.M.G., M. S. Evans, M.L.A., P. D. Simmons, W. R. Poynton, Hon. C. G. Smith, M.L.C., G. S. Armstrong, M.L.A., H. R. Bousfield, W. G. Brown, C. Henwood, J. Livingston, John Nicol, C.M.G., H. H. Puntan, R. H. Wisely, V. Seymour, H. Sparks. Secretary: John Morley. Committee: J. Ellis Brown, J. Burman, C. A. L. Bull, D. Doyle, Samuel Deane, James Henderson, W. Konigkramer, W. D. Kimber, W. J. Mirrlees, W. Milne, J. Swales, W. J. Thompson, C. Wilson, Wilfred Payne, Wallis Short, S. T. Amos, J. McBride, F. M. Hillier, W. A. Stocken, and W. A. Bath. Treasurer: Edwin Greenacre. Auditor: W. Murray Smith.

DURBAN COUNTY FARMERS' ASSOCIATION.—Patron: J H Colenbrander. President: J McIntosh. Vice-Presidents: H Westermeyer, R R McDonald. Committee: F R W Behmer, G Compton, H Freese, W Freese, W Gillitt, H W Koenigkramer, H W Nichols, F Schaefermann. Hon Secretary and Treasurer: Frank J Volek.

EMPANGENI AND DISTRICT SUGAR PLANTERS' AND FARMERS' ASSOCIATION.—President: Col. C. B. Addison. Vice-President: P. Stott. Secretary and Treasurer: F. Piccione, P.O. Empangeni. Executive: P. Addison, G. Higgs, — Salveson, — Blake.

ESHOWE DISTRICT FARMERS' ASSOCIATION.—President: J R Pennefather. Vice-President: C F Adams. Secretary: T Parkins. Treasurer: W T Brockwell.

GOURTON FARMERS' ASSOCIATION.—Chairman: M Sandison. Vice-Chairman: R Gray. Hon Secretary and Treasurer: Frederick B Burnard, Highfield P.O. Committee: Dr Landon, J.P., E Reed, J Woods, C van der Merwe.

HATTING SPRUIT FARMERS' ASSOCIATION.—President: A W Smallie. Vice-President: Thos Brookes. Hon Secretary and Treasurer: R J Hearn. Committee: G Queddon, N Glutz, Wm Craig, W R Qusted, W T Heslop, Thos Dewar, A E Norman, D P Campbell, J J Grove, H J Hearn, D W H Tandy, J B Pendar, J Campbell, J Barbour.

HIMEVILLE AGRICULTURAL SOCIETY.—President: Henry C Gold, Dartford, Underberg. Vice-Presidents: F E Peto, G H Royston, J B Nicholson. Hon Secretary and Treasurer: G Palframan, Watermead, Underberg. Executive Committee: G Malcolm, W S Johnston, P McKenzie, F E Peto, J S Gordon. Yard Steward: D T Malcolm. Auditors: T C Dearlove and F E Peto.

HOWICK FARMERS' ASSOCIATION. — Chairman: Thos Morton. Vice-Chairman: M A Sutton. Hon Secretary and Treasurer: A Clark.

INGOGO FARMERS' ASSOCIATION.—President: E. W. Noyce. Vice-Presidents: G. A. Fimstone and D. A. Drummond. Hon Secretary and Treasurer: C. Drummond.

Ixopo AGRICULTURAL SOCIETY.—President: F L Thring, J.P. Vice-Presidents: Col W Arnott, B.M.R., W K Anderson, J.P., C E Hancock, J.P. Committee: John Anderson, Thos Allen, J C Auld, H D Archibald, F S Benningfield, S Boyd, T L Clarence, F E Foxon, R.M., Wm Foster, Jas T Foster, C C Foster, Geo E Francis, L Gray, A M Greer, J.P., J R Greer, Wm Gold, H A Hill, C F Harris, A E Keith, R Kennedy, Geo Martin, W Oakes, L J Phipps, T F Remfry, J W Robinson, Jas Schofield, M.L.A., D C Smail, A Stone, W R Way, A H Walker, M.L.A., P D Webb. Hon Secretary: G C Way, Hon Assistant Secretary: A G Harris. Hon Treasurer: T Arnott.

Ixopo FARMERS' ASSOCIATION.—President: C. E. Hancock, J.P. Vice-Presidents: T. F. Remfry and R. Vause. Hon. Secretary and Treasurer: Geo. E. Francis, Morningview, Ixopo. Delegates to Farmers' Union: Col. Arnott and T. F. Remfry, with W. D. Campbell as reserve. Committee: John Anderson, W. Oakes, D. Campbell, G. C. Way, James Foster, A. Keith, G. Martin, F. Z. Thring, A. C. Kirkman.

KLIP RIVER AGRICULTURAL SOCIETY.—President: Daniel Bester, Vice-Presidents: Herman Illing, J G Bester, Wm A Illing. Secretary and Treasurer: Edward V Bambrick (Box 90, Ladysmith). Executive Committee: A Brink, J Farquhar, C.M.G., M.L.A., W C Hattlingh, J G Hyde, Trev Hyde, A I Horsley, W Freer, L A Leonard, H Nicholson, H C Thornhill, Herman Illing, D Munger, P de Waal, J H Newton, D Sparks, J.T., J T Francis, A W (Gus) Illing, G Pinkney, W Cochrane, George L Coventry, and *ex officio* officers.

KRANTZKOP FARMERS' ASSOCIATION.—President: Capt M Landsberg. Vice President: P R Vermaak. Hon Secretary and Treasurer: G T van Rooyen. Committee: C J van Rooyen (Albany), C J van Rooyen (Wonderfontein), J. A. G. Mare, L M van Rooyen, R P Martens, J P Nel, Dr Proksch, and F E van Rooyen.

LION'S RIVER DIVISION AGRICULTURAL SOCIETY.—President: Graham Hutchinson. Vice-President: H Nisbet. Executive Committee: H Nisbet, M A Sutton, A J Holmes, J Humphries, Jno Pele, and W A Lawton. Auditor: W J R Harvard. Hon Secretary and Treasurer: Arthur F Dicks, P.O. Box 1, Howick.

LITTLE TUGELA FARMERS' ASSOCIATION.—President: F van de Waal. Vice-President: F G King. Secretary and Treasurer: H L Frances. Auditor: A D Buchanan. Committee: P R Summersgill, F W Holmes, J P Wepenaar, J J Harding, Max Cameron.

LOTENI FARMERS' ASSOCIATION.—President: J A Tod. Vice-President: T Carter. Hon Secretary: A Kennedy Stone.

LOWER TUGELA DIVISION ASSOCIATION.—President: W R Hindson. Vice-President: A E Foss. Hon Secretary and Treasurer: H Curtis Smith (Stanger). Committee: A S L Hulett, F Addison, G Stewart, T G Colenbrander.

LOWER UMZIMKULU AGRICULTURAL ASSOCIATION.—President: D C Aiken, J.P. Vice-Presidents: H Aibers and C H Mitchell, J.P. Hon Secretary and Treasurer: W J Plows. Committee: C Manning, J W Aiken, W G Camp, T F Godwin, J Hutton, H Norden and A Borchard. Hon Secretary, Show Committee: J W Aiken. Show Committee: A E Collison, A Borchard, F Knoop, A Ringo, H F Voigts, J Hutton, C Manning, A J Lugg and H Albers. Hon Auditor: J W Aiken.

MID-ILLOVO FARMERS' CLUB.—Chairman: L G Wingfield-Stratford, J.P. Vice-Chairman: B B Evans. Hon Secretary: J W V Montgomery. Assistant Hon. Secretary: A L Wingfield. Hon Treasurer: Jos McCullough.

MOOI RIVER FARMERS' ASSOCIATION.—President: R Garland. Vice-President: C B Lloyd. Hon Treasurer: H A Rohde. Collector: Capt W H Stevenson. Auditor: Claude Scott. Hon Secretary: H B Hall.

MUDEN AGRICULTURAL ASSOCIATION.—President: Thos Thresh. Vice-Presidents: Wm Lilje, E A Grantham. Secretary and Treasurer, C A Selling. Committee: Otto Rottcher, Karl Lalje, Karl Rotter, Herman Schafer, Fritz Torlage, T Braithwaite, Ernest Rottcher, C H Tlilbrook, Rev H Rottcher (Hon Life Member).

NEWCASTLE.—President: F A R Johnstone, J.P. Vice-President: C Earl, J.P., Mayor of Newcastle; Angus Wood, J.P., Ingogo; O Schwikkard, C.M.G., Newcastle. Secretary: Wm Beardall. Treasurer: Ed Nicols. Executive Committee: L H S Jones, E Phillips, H C Caldecott, C Watson, G Langley, W A Lang, W J P Adendorff, J E de Wet, O Davis, S W Reynolds, B Pettigrew, G W Thomas, G H Bishop, H R Muir, M C Adendorff, W Napier, P Van Breda, Chriss Botha, G Templar.

NEW HANOVER AGRICULTURAL ASSOCIATION.—President: G C Mackenzie. Vice-Presidents: J C Watt, J.P., and R H Oellermann. Life Member: C A S Yonge, M.L.A. Secretary and Treasurer: W D Stewart, New Hanover. Auditor: J H F Hohls. Committee: W N Angus, E Bentley, W W Bentley, Edward Boast, E E Comins, G R Comins, C Crookes, jun, H Dinkelmann, J Duval, W Fortmann, Dr C H Herbert, J Hillermann, J H F Hohls, H Jacobson, H A Iight, G C Mackenzie, A F Mackenzie, T M Mackenzie, J Muirhead, J.P., Oswald Muirhead, G Moe, J.P., J Moe, O Moe, C Oellermann, F Oellermann, C J Oellermann, W Ortmann, J C Otto, E Peckham, J.P., J A Potterill, S Peckham, C M Scott, Rev J Scott, Wm Schroeder, J.P., Owen Solomon, J H Smith, Riby Smith, F Thole, H Vorwerk, H F Westbrook, W H Westbrook, C Westbrook, T Wolhuter.

NOODSBERG ROAD AGRICULTURAL ASSOCIATION.—President: Fritz Reiche, J.P. Vice-Presidents: H Mummbrauer, P Rodshorst, W Dralle, W Wortmann. Committee: W Bartels, F Bosse, H Brammer, A J Bruyns, H Bruyns, Carl Dralle, H Gebers, W Gevers, J H Holley, jun, W C Holley, C Hillermann, I Koch, H Kohler, F E Kuhn, M Maister, H Mereis, A Meyer, H Meyer-Estorf, H W Meyer, K A Meyer, H Misselhorn, W Misselhorn, K Peters, I Pfothenhauer, G Rabe, G Reiche, Joh Reiche, W Rencken, H Rosenbrock, H Schmidt, K Schmidt, Rev Jas Scott, K Seele, F J Smith, J Thies, W Witthoft, P Worthmann, A Worthmann, F Worthmann, H Worthmann. Secretary: Paul Vietzen, P.O., Singletree. Hon Treasurer: E Beurlen.

NOTTINGHAM ROAD FARMERS' ASSOCIATION.—President: B. Greene. Vice-President: Geo Ross. Secretary and Treasurer: C J King, Nottingham Road. Hon Auditor: H Singleton.

PIETERMARITZBURGSCH BOEREN VEREENIGING.—President: D P Boshoff. Secretary: E G Jansen, 313, Loop Street, Maritzburg.

POLELA AGRICULTURAL AND HORTICULTURAL SOCIETY.—President: J Isbister. Vice-Presidents: W H Allwright, J F Alexander, and H Brown. Hon. Secretary and Treasurer: J Anderson Speak. Auditor: A Brown. Executive Committee: J Isbister, W H Allwright, J F Alexander, H Brown, H J Gazzard, G W Foster, J Anderson Speak. Hall Committee: W H Allwright, F Crossley, A Brown, with the trustees—J F Alexander, H E Mingey, and Geo Forder.

RICHMOND AGRICULTURAL SOCIETY.—President: John Marwick. Vice-Presidents: W P Payn, J W T Marwick, C O and J W McKenzie and Chas Nicholson. Hon Treasurer: R Nicholson. Hon Secretary: Cecil Williams. Committee: Evan Harries, R A McKenzie, H M Moyes, Thos Marwick, J C Nicholson, J W Flett, A W Cooper, J.P., J W Hammond, C E Simes, Tom McCrystal, and the seven office-bearers (*ex-officio*).

RICHMOND ROAD FARMERS' ASSOCIATION.—President: Thos Stead, J.P. Vice-President: W Mapstone. Secretary and Treasurer: W L Stead, New Leeds. P.O. Committee: D Malcolm, J Mapstone, W P Payne, J James, J Sinclair, W S Crouch, H B Boyd, W Middleton, W Oldfield, T E Horwood.

ROYAL AGRICULTURAL SOCIETY OF NATAL.—President: Sir G M Sutton, K.C.M.G. Vice-Presidents: W S Crart, Jas King, D C Dick, G J Macfarlane, C.M.G., O Hosking, with His Worship the Mayor, *ex officio*. Secretaries, Treasurers and Collectors: Duff, Eadie & Co, 12, Timber Street, Pietermaritzburg. Yard Superintendent: H J Stirton. General Committee: T J Allison, W H Buchanan, F G Burchell, W H Cobley, P H Campbell, R Comins, W P Gough, E S Goodwill, K H Hathorn, K.C., T W J Hall, J Hall, L Line, Col Sir D Mackenzie, K.C.M.G., Jas Morton, Sir T K Murray, Jno Moon, W J O'Brien, P Otto, R H Pepworth, J F Potterill, A Robinson, Rev J Scott, P D Simmonds, H Solomon, W L Stead, H J Stirton, Dr Oddin Taylor, F W Jameson, S J Mason. Executive Committee: President, Vice-Presidents, and W J O'Brien, W H Cobley, K H Hathorn, K.C., and Col E M Greene. Members appointed by Corporation: Councillors Ireland, Sanders and Hathorn.

SLANG RIVER (UTRECHT) FARMERS' ASSOCIATION.—Chairman: P J Kemp. Executive Committee: J J Uys, J Z Moolman, T J Botha, P J Viljoen, P J Kemp. Hon Secretary and Treasurer, Thys Uys, Utrecht P.O.

UMSINGA-BIGGARSBERG FARMERS' ASSOCIATION.—President: E C Nuss. Vice-President and Acting Secretary: Geo S Saunders, Helpmakaar.

UMVOTI AGRICULTURAL SOCIETY.—President: Major T Menne. Vice-Presidents: Theunis J Nel, M.L.A., W J Slatter, W L'Estrange. Executive Committee: Tol Nel, A Newmarch, W Lilje, O Rottcher, S C Van Rooyen, W Newmarch, E J Van Rooyen, O Norton, I M Nel, J Browning. Managers of Show Yard: J M Handley and N Hunter. Hon Auditor: W K Ente. Secretary and Treasurer: W H Gibbs.

UMVOTI FARMERS' ASSOCIATION.—President: P R Botha (J's son). Vice-President: J M Handley. Secretary and Treasurer: G E Cadle (Box 6, Greytown). Auditor: J M Nel. Committee: W J Slatter, J G Nel, H F Torlage, R J Landsberg, A Newmarch, P H van Rooyen, A F Handley.

UPPER BIGGARSBERG FARMERS' ASSOCIATION.—President: W L Oldacre. Vice-President: G Langley. Hon Secretary: W F B Sutherland.

UTRECHT AGRICULTURAL SOCIETY.—Chairman: L Viljoen. Vice-Chairman: B H Breytenbach. Members: I Bierman, M M Knight, J H Klopper, B C Hattingh, T Botha, M Gregory, P L Uys, H P Breytenbach. Secretary: G J Shawe.

UTRECHT BOEREN VEREENIGING.—President: D J A van der Spuy. Secretary: G J Shawe, Utrecht.

VICTORIA COUNTY AGRICULTURAL SOCIETY.—President: Lient-Col F Addison. Vice-Presidents: Sir Liege Hulett, Kt, M.L.A., W J Thompson, Esq, J.P., J Polkinghorne, Esq, M.L.A. Committee: Messrs W H B Addison, G S Armstrong, M.L.A., C Bishop, J.P., D Brown, sen, J.P., W Campbell, T C Colenbrander, A E Foss, J.P., A S L Hulett, J.P., J B Hulett, C Jackson, G Nicholson, J.P., T Polkinghorne, J W Perkins, J.P., E Saunders, J.P., G Stewart, and J H Stansell. Hon Secretary and Treasurer: H Curtis Smith (Stanger).

VRYHEID (WARD I.) AGRICULTURAL SOCIETY.—President: E Dalton. Vice-President: J F Potgieter. Secretary: F Kolbe. Assistant Secretary: H Lombaard. Committee: Secretary, Assistant Secretary, and A von Levetzow, T Ries, P Grobler, F Molman, A Steenkamp.

WEENEN AGRICULTURAL SOCIETY.—President: Allan Stuart. Vice-Presidents: R Garland, R H Ralfe, F I de Waal. Hon Treasurer: F C Schiever. Hon Secretary: E Cautherley. Auditor: S Wolff. Executive Committee: Hon H D Winter, M.L.A., J W Moor, M.L.A., D W Mackay, T H Hindle and L L'Estrange. Manager of Show Yard: S Vaughan. Assistant: A Clouston.

WEENEN COUNTY HORTICULTURAL SOCIETY: Committee of Management: The President and Treasurer of the Weenen Agricultural Society and C J Offord, G W Linfoot, T J Nunn, Dr Brewitt, S Vaughan. Hon Secretary: F Cautherley.

ZULULAND FARMERS' ASSOCIATION.—President: F W White. Vice-President: C E Symonds. Secretary: R H McAlister. Committee: Hon D C Uijs, A W Symonds, H T James, R J Ortlepp, J N R Dixon.

ZULULAND COAST FARMERS' ASSOCIATION.—President: G H Hulett. Vice-President: C Hill. Hon Secretary and Treasurer: F Brammage, Ginginhlovu.

East Coast Fever Advisory Committees.

(NOTE.—Owing to sparse European population, the following Magisterial Divisions have no Advisory Boards: Ubombo, Mapumulo, Ingwavuma, Mhlabatini, Ndwandwe, Nkandhla and Hlabisa.)

ALEXANDRA.—Chairman: W Thompson, Umzinto. Members: H Bazley, R C Archibald, A Blamey, H Reynolds, G J Crookes, R Parkin, J A Curle.

ALFRED.—Chairman: Magistrate. Members: A G Prentice, Rev. S Aitcheson, J E Brown, F H Boddy, H M Raw, H Rethman, H C Hitchens, H J R Hatchwell, W P Bouserie.

BERGVILLE.—Chairman: T E Zunckel, J.P., Bergville. Members: P H Van der Riet, J G Fannin, H Jackson, C Halferty, F Zunckel, Mbulali—Consulting member for natives.

BULWER.—Chairman: Magistrate. Members: R Comrie, Wm Colville, R Gordon, H Cole, P Garson, P McKenzie, G Malcolm, H C Gold, R Justice, E Stafford, W Little.

CAMPERDOWN.—Chairman: A N Kirkman, Cato Ridge. Members: J F Erfmann, P J Kingham, W B Turner, C J A Scheepers, W Mercer, L G Wingfield Stratford, J W Harvey, B B Evans, J W V Montgomery, B R Buchanan, W L Stead. SUB-DIVISIONAL BOARDS.—No. 1. *East of Railway Line from "Spitzkop" to Railway Line.*—Chairman: J F Erfmann, Cato Ridge. Members: P J Kingham, H Dinklemann, F L Meyer, J H Meyer, H A Meyer. No. 2. *East of Railway Line from West of Government Fence.*—Chairman: C J A Scheepers, Thorneybush. Members: W B Turner, W Mills, J F Scheepers, H Nadauld, G S Phipson. No. 3. *West of Railway Line from Koning Krantz to Killairney and along Umlaas River.*—Chairman: A N Kirkman, Clairmont. Members: W Mercer, W Brown, R Godfrey, W S Meyer, E W Meyer. No. 4. *West of Railway Line, rest of Division between Main Line, Umlaas River Boundary of No 3.*—Chairman: W L Stead, Thornville Junction. Members: F H Meyer, J R Schwegmann, W E Schwegmann, W S Crouch, B R Buchanan (Hon. Sec., Manderston). No. 5. *West of Main Line, Beaumont, East of Main Mid-Illovo River from Westley's Drift to Umgwaranta River.*—Chairman: J W Harvey, Camperdown. Members: L G Wingfield Stratford, R Lyne, C A Hutton, E H Hayes, F E Groom. No. 6. *Mid-Illovo West of Line, rest of Division South of Umlaas River.*—Chairman: R B Evans. Members: J W V Montgomery, J H McCullough, J Ballam, J James, H S Power.

DUNDEE.—Chairman: F Turton, Glencoe Junction. Members: J Campbell, J J Grove, H Wiltshire, G M De Waal, Aug Jansen, A J Potgieter, A Cronje, A Schuid, H Greenhough. SUB-DIVISIONAL BOARDS.—*Glencoe Sub-area.*—Members: F Turton, H Greenhough, W H Miller, F Schroeder, V Marshall, J Lausen, J J De Jager, Rev Father Rauch (Native interests). *Hatting Spruit Sub-area.*—Members: J J Grove, H A J Davil, A E Norman, J Campbell, Rev J Dewar (Native interests). *East of Helpmakaar Road.*—Members: A M Cronji, D C Pieters, P Meyer, J A Naude, A Jansen. *West of Helpmakaar Road.*—Members: A J G Meyer, A P Lund, D C Uys, A J Van Tonder, Jun, A J Potgieter. Members of Joint Committee for Area West of Helpmakaar: A J Potgieter, A P Lund. Members of Joint Committee for Area East of Helpmakaar: A Jansen, A M Cronji. *Area between Main Fryheid Railway Lines.*—Members, W Craig, H Wiltshire, C M Meyer, Sen, A Spies, Jun, C M De Waal.

DURBAN BOROUGH.—Chairman: E L Acutt, Durban. Members: H R Bousfield, R Benningfield, G Swales, J Haynes, — Arthur.

EMTONJANENI.—Chairman: Magistrate. Members: F W Smith, H J James, F W White, A W Symmonds, R J Ortlepp, D C Uys, L J Van Rooyen.

ESHOWE.—Chairman: A Boast, Magistrate. Members: A Moore, G H Hulett, C F Adams, T Parkins, A T Wantink, F J Dickens, H H Thole.

ESTCOURT.—Ward 2. *East of Main Line.*—Chairman: A Stuart. Members: Magistrate, J Ralfe, J W Haw, J G Hatting, A Peniston, A B Haviland, G M Rudolph. Ward No. 3. (Boundaries): The Bergville Magisterial Division, Tugela

to junction of the two Tugelas; The Winterton Settlement fence to Vaai Plaats fence and Ovington and Sibhamie's Location fence, and from there to Government Game Reserve).—Chairman: H J De Waal, Glenisla. Members: R Gray, M Sanderson, R J Land, A Spearman, H L Bacon. *Ward No. 4* (Estcourt West of Railway Line; follow Bushman's River as far as Mr. Kerr's farm, then Nalaara's Location fence as far as Game Reserve).—Chairman: R H Ralfe. Members: F C Schiever, J Rencken, W Couch, P Male, T L Fyvie, J Hatting, A W J Hatting. *Ward No. 5* (Boundaries: Remainder of District West of Line).—Chairman: H Blaker, Estcourt. Members: W Comins, E B Griffin, H A Woodruffe, Col. Crompton, J Russell, A C Robinson, Jun, A E Downing, A D Shaw, J W Bentley.

GREYTOWN.—Chairman: Paul Hansmeyer, Greytown. Members: D Havemann, A Newmarch, J A Nel, W T Slatter, A T Handley, H S Botha. *Central Board*.—Chairman: P Hansmeyer, Greytown. Members: J A Nel, A Newmarch, W J S Newmarch, T K Taylor, S W Cadle, R J Van Rooyen, E J Van Rooyen, J G Nel.

INANDA.—Chairman: C R Bishop, J.P., Umgeni. Members: R Harrison, W Sykes, Jun, E Dore, W Campbell, R Armstrong.

KLIP RIVER.—*No. 1* (A line from Elands Laagte along the Matawaans and Jononos Kop to the Berg; North line, Dundee boundary: all West of Main Line).—Members: C Mitchell Innes, R M Gray, L Meyer, J C Henderson, C Allen. *No. 2* (O.R.C. line and boundary No. 1). Members: D Bester, A J Marais, W Allison, J Bester, — Brink. *No. 3* (From Klip River Bridge to Sand Spruit, and up Sand Spruit to its source in the Berg).—Members: H A Potgieter, A A Wetherell, B Nel, F Van Rooyen, H Portsmouth. *No. 4* (Rest of Division South and East of Sand Spruit and West of Main Line).—Members: W Leathern, H Illing, J H Newton, E Robinson, G W Willis. *No. 6* (Whole of Division East of Main Line).—Chairman: J G de Waal. Members: R A Smith, H Nicholson, P Cronje, J Farquhar.

KRANTZKOP.—Chairman: L L D Proksch, Krantzkop. Members: L M J Van Rooyen, L M J Van Rooyen, F E Van Rooyen, J H Van Rooyen, J P Zietsman, A Johnson.

IXOPO.—Chairman: Magistrate. Members: Thos Allen, Geo Martin, E Marriott, A Stone, G A Cooper, J.P., Wm Gray, D Campbell, F L Thring, J.P.

LION'S RIVER.—*No. 1* (Southern portion of West of Main Line).—Chairman: U K McKenzie, Lidgetton. Members: R J Spiers, F North, A McLean, J Morphew. *No. 2* (Northern portion West of Main Line).—Chairman: G Ross, Nottingham Road. Members: J Clouston, K Soutar, D Connel, D Smythe. *No. 3* (Southern portion East of Main Line).—J W Dicks, "Rosebank," Howick. Members: W M Henderson, — Buchanan, Jos Raw, H J McKenzie. *No. 4* (Northern portion East of Main Line).—Chairman: H Burgmann. Members: W Methley, G Hutchinson, J J Morton, B Taylor. (The whole of the members of the Sub-Divisional Boards constitute the Central Board with the Magistrate, Lion's River, as Chairman.)

IMPENDHLE.—Chairman: T Fleming, Boston. Members: J Martens, P J Lourens, T Carter, C W Brooke, J W McLean, H Boike, C C Lewis, W S Alborough, W Harrington, C W Roberts, D Tootell. *Sub-Committee appointed for Northern portion of Division* (added to Lion's River Division).—Chairman: P J Lourens, Insinga, via Nottingham Road. Members: H Boek, C N Brooke, T Carter, J Martens, J W McLean. *Sub-Committee for Southern portion of Impendhle*.—Chairman: T Fleming, Boston. Members: C C Lewis, W S Alborough, W Harrington, C W Roberts, D Tootell.

LOWER TUGELA.—Members: W H B Addison, A E Jackson, H E Essery, A S L Hulett, J Brown, W O Robbins.

LOWER UMZIMKULU.—Chairman: Col. J F Rethman, North Shepstone. Members: Col. J R Royston, D C Aitken, J.P., C H Mitchell, J.P., G P Beachcroft, Claude Manning, H Albers, N Harper, J S Clarke, A Borchard, T Stapleton, Col. Bru-de-Wold.

MOOI RIVER.—Chairman: W. G. Randles. Members: J. H. Wallace, H. F. Cadle, R. Garland, John Bartholomew, J. W. Johnstone, C. R. Skottowe, J. N. Boschhoff, J. K. Lindsay.

MTUNZINI.—Chairman: Magistrate. Members: F Green, G M J Gielink, G Getkate, W Saville, A H Konigkramer.

NEWCASTLE.—No 1 (to be known as Charlestown-Ingogo District from main line of Railway where it strikes the Southern line of the farm Cloutant West, thence along Western boundary of said farm, thence along S. W. boundary of Tipperary West, thence Southern boundaries of Hamstead, Dumferline and Roodeport, thence along the Northern side of the Botha's Pass main road to where it joins the O.R.C. Boundary, thence along the boundary of the Colony, thence along the Charlestown Fence to where it joins the Railway line near Mount Prospect Gate, thence along the Railway line to Cloutant West).—Chairman: J Vos, Charlestown F.O. Members: W J Adendorff, A J Johnstone, A Paine, A H Trouw, Angus Wood. No. 2 (Newcastle district Southern boundary of No. 1 along Railway line from Cloutant West, including portion of Town Lands, Newcastle, which by agreement with Government is considered to be West of line, thence along Railway line where it strikes the Southern boundary of the farm Kopjeallen, thence along Southern boundaries of Kopjeallen, The Gardens, and Lincoln to the Ingagane River, thence up the Ingagane up to the farm Falixtowe, along Southern boundaries of Falixtown, B. Iwerton, Brooklyn, Stonehenge, Tathamscamp, Hanover, Ellensdale, Endsel, Bejuisel, Stelazies Kop, Mount Blanc, to O.R.C. border fence, thence along O.R.C. boundary joining Southern boundary of No. 1 at Botha's Pass).—Chairman: S W Reynolds. Members: F A R Johnstone, W Moller, J.P., L H S Jones, C Earl, F Meyer, J J Muller, — Van Breda, J Macdonald, J C Adendorff, E Sanders. No. 3. *Dannhauser District* (Bounded by Southern District No. 2 from the Railway line at Kopjeallen to the Berg, thence along O.R.C. border, the boundary between Newcastle and Klip River Divisions, thence along the Railway line to the farm Kopjeallen).—Chairman: W L Oldacre, Dannhauser. Members: Geo Friend, B Harrington, L J Muller, J Ecksteen, E Hodson, W Watson, Ted Twyman, G Langley, Don Urquhart. No. 4 (East of Railway Line, along the boundary between Newcastle and Dundee Divisions from the Railway Line near Dannhauser to the Buffalo River, along the Buffalo River to the junction of the Ingagane, thence along the Ingagane to its junction with the Ineander, thence along the Ineander to the fence of the Newcastle Town Lands, known as the Eastern boundary of the Railway Line, thence along the Eastern side of the Railway Line to the Magisterial Division boundary near Dannhauser).—Chairman: T K Boshoff, Dannhauser. Members: J H Potgieter, H Miller, J H van der Westerhuizen, J J Kemp, W Dicks, C Uys. No. 5 (the strip of land lying between the Railway Line and the Buffalo River from the Ingagane and Ineander streams, which form the North-Western boundary of No. 4 district).—Chairman: E W. Noyce, Boscobello P.O.; members, Geo Matthews, T K Panzera. *Central Board.*—Chairman: S W Reynolds, Newcastle. Members: F A R Johnstone, J Vos, Sen, Angus Wood, W Oldacre, W Watson, E W Noyce, F N Panzera, T R Boshoff, J H van der Westhuizen.

NEW HANOVER.—Central Board. Chairman: E Newmarch. Members: W W Bentley, T C Wolluter, F Reiche, H Schmidt, E Lindhorst, W L'Estrange, A F McKenzie, W Meyer. *New Hanover Sub-Committee.*—Chairman: E Newmarch. Members: Jno Moe, W W Bentley, W Ortmann, T C Wolluter, O J Muirhead. *Dalton Sub-Committee.*—Chairman: W L'Estrange. Members: A F McKenzie, R W Smith, G Reddinger, H Rosenbrock, J H Gordon, W Meyer. *Schroeders Sub-Committee.*—Chairman: F Reiche. Members: H Schmidt, E Lindhorst, G Moe, P Rodehorst, H T Rohrs, F Gordon, A Meyer, W Fortmann.

NQUTU.—Chairman: A Barklie, Utrecht. Members: H Wilkins, R L Flindt, W A Westbrook, J W F Hall, Dr. Knight.

PAULPIETERSBURG.—Chairman: N J Els, Viljoen's Rust. Members: J B Rudolph, G J Combrink, A Schutte, A Bester, P H van Rooyen.

PIETERMARITZBURG.—Chairman: B Swete Kelly, Pietermaritzburg. Members: W S Crart, C A Fawcett, W E Goodwin, E G McAlister, E E Hodgson.

RICHMOND.—Chairman: Magistrate. Members: E E Johnson, J Mapstone, G D Alexander, C P Lewis, C Nicholson, W Comrie, John Marwick, W P Payne, A H Cockburn. *Sub-Division No. 2.*—Chairman: G D Alexander, Nel's Rust. *Sub-Division No. 5.*—Chairman: W Oldfield, Fox Hill.

REIT VLEI DISTRICT.—Chairman: D. E. Muir, J.P., Elsmore, Mooi River. Members: P. Otto, J.P., R. J. Van Rooyen, E. J. Van Rooyen, J. G. Nel, A. Kohrs, J. Hooper, Otto Norton (Hon. Secretary).

SEVEN OAKS DISTRICT.—Chairman: W J S Newmarch, Harden Heights. Members: H M Balding, J.P., J Crow, J T Martens, H Mayne, S W Cadle,

UMGENI DIVISION.—Chairman: E. S. Goodwill. Members: F. Schreenn, B. Crompton, C. Arnold, R. J. Potts, A. J. Tyler, F. J. Smith, A. Wood, J. P. Symonds, J. J. Potterill, W. H. Keytel, C. Lund.

UMLAZI.—Chairman: C. Henwood, Durban. Members: W. Pearce, W. Gillett, H. Freese, L. Jackson, P. W. Mackenzie.

UMSINGA.—No. 1 District (All farms lying West of the Umsinga-Helpmakaar main road).—Chairman: E. C. Nuss. Members: W. W. Strydom, J. P., J. H. Nuss. No. 2 District—(All farmers East of the Umsinga-Helpmakaar main road—excepting the farms Sutherland, Gordon, Memorial Mission and Pomeroy Town Lands, and Location lying North of the Mazabeko and West of the Buffalo River).—Chairman: W. H. Wholberg, P. O. Elandsdraal. Members: H. W. Dedekind, J. Dedekind. No. 3 District—(The remaining portion of the area lying in the Umsinga Division).—Chairman: A. Muller. Members: M. J. Matheson, H. Muller. The three Committees to constitute the joint Committee.

VRYHEID.—Chairman: A. von Levetzow, Vryheid. Members: P. Labuschagne, B. E. A. Rabe, G. M. van der Westhuizen, J. Kruger, J. F. Potgieter, L. M. N. Nel.

WEENEN.—Chairman: C. G. Jackson, Weenen. Members: C. Harding, J. P., P. J. van Rooyen, J. P., K. Rotteher, S. B. Buys, J. J. Vermaak, L. C. Kinsman, J. W. A. Pole, C. F. Vermaak, P. R. Buys, J. C's son.

Publications Issued by the Department of Agriculture.

THE following publications, issued by the Department of Agriculture, are still in print, and copies may be obtained free (except those with price attached) upon application to the office of the *Agricultural Journal*, Department of Agriculture, Pietermaritzburg. The figures in square brackets (e.g. [1904]) are the years in which the various publications were issued.

No.

BULLETINS.

- 2.—“Manures on the Natal Market, 1902,” by Alex. Pardy, F.C.S., Analyst. [1902.]
- 4.—“Manures on the Natal Market, 1903,” by Alex. Pardy, F.C.S., Analyst. [1903.]
- 6.—“Manures on the Natal Market, 1904,” by Alex. Pardy, F.C.S., Analyst. [1904.]
- 7.—“Tree-planting in Natal,” by T. R. Sim, F.L.S., Conservator of Forests. [1905.]
(Price 2s. 6d., post free.)
- 8.—“Agricultural Co-operation,” by E. T. Mullens, Secretary, Minister of Agriculture. [1905.]
- 10.—“Manures on the Natal Market, 1905,” by Alex. Pardy, F.C.S., Analyst. [1905.]
- 11.—“East Coast Fever,” by S. B. Woollatt, Principal Veterinary Surgeon. [1906.]
- 12.—“Manures on the Natal Market, 1906,” by Alex. Pardy, F.C.S., Analyst. [1906.]
- 13.—“Report on the Disease known as ‘Bluetongue’ in Sheep,” by H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E., Govt. Bacteriologist and Director, Govt. Laboratory. [1908]
- 14.—“Poultry-Keeping in a Simplified Edition for Farmers,” by F.C. [1908.]
- 15.—“Some Common Bagworms and Basketworms,” by Claude Fuller. [1909.]

REPORTS.

Annual Report of the Agricultural Department, 1902. (Includes Reports of the Director of Agriculture, Entomologist, Conservator of Forests, Dairy Expert, Editor *Agricultural Journal*, etc.) [1903.]

Report of the Secretary, Minister of Agriculture: January 1, 1903, to June 30, 1904. [1905.]

Report of the Secretary, Minister of Agriculture, for the year ended 30th June, 1905. [1905.]

Report of the Secretary, Minister of Agriculture, for the year ended 30th June, 1906. [1906.]

(For a continuation of the statistics given in these reports see reprint "Natal's Progress in 1906," noted below.)

Fourth Report of the Government Entomologist: 1903-4. [1905.]

Fifth Report of the Government Entomologist: 1904-5. [1906.]

Sixth Report of the Government Entomologist: 1905-6. [1907.]

(The Third Report of the Entomologist is included in the "Report of the Agricultural Department, 1902," noted above.)

Report of the Conservator of Forests, 1902. [1903.]

Interim Report of the Conservator of Forests up to December 31, 1905.

Report of the Principal Veterinary Surgeon, for year ended 30th June, 1906. [1907.]

First Annual Report of the Land Board, 1905. [1906.]

Annual Report of the Land Board, 1906-7.

MISCELLANEOUS REPRINTS, ETC.

Black Spot ("Letter Book Pages": reprinted from *Journal*.)

Mealie Grubs (do do)

Mosquitoes (do do)

Woolly Aphis (do do)

Cotton. By A. N. Pearson, Director, A. E. & C. (Reprinted from *Journal*: 1904.)

Co-operation. By E. T. Mullens, Secretary, Minister of Agriculture. (Reprinted from *Journal*: 1907.)

Citrus Fruit Export. (Reprinted from *Journal*: 1907.)

Natal's Progress in 1906. (Reprinted from *Journal*: 1907.) The statistics contained in this paper are on the same lines as those in the Annual Reports for previous years of the Secretary, Minister of Agriculture.

Natal's Progress in 1907. By H. J. Choles, F.S.S. (Reprinted from *Journal*: 1908).

Fibre Cultivation. (Reprinted from *Journal*: 1907.) This paper is a summary of Bulletin No. 13 of the Department of the Interior, Bureau of Agriculture, Manila.

Sisal, Mauritius Hemp and other "Aloe" Fibres. By T. R. Sim, F.L.S., Conservator of Forests. (Reprinted from *Journal*: 1907.)

The Fibre Industry of Mauritius. By Leonard Acutt, J.P., Tongaat; Member of the Land Board, Natal. (Reprinted from *Journal*: 1907.)

South African Products Exhibition, 1907. Report of T. R. Sim on the Natal Exhibits. (Reprinted from *Journal*: 1907.)

Poplar Timber for the Local Manufacture of Matches. By E. R. Sawyer, Director, E.S. (Reprinted from *Journal*: 1908.)

Agricultural Industries and Land Settlement in Natal. [1907.]

Judging Fruit, Flowers, Plants and Vegetables at Shows. By T. R. Sim, F.L.S., Conservator of Forests. [1906.]

Agricultural Statistics, Natal, 1905-6. [1907.]

Model Rules for Agricultural Co-operative Societies. (Price 1s., post free.)

Government Laboratory.

SCALE OF CHARGES FOR ANALYSES, VACCINES, ETC.

The following is the scale of charges fixed for analyses, etc., at the Government Laboratory, Allerton, Pietermaritzburg :—

Drinking-water Analysis :				£	s.	d.
Chemical ... ..	...	...	...	2	2	0
Bacteriological ... ..	...	...	...	5	5	0
Milk, Analysis ... ..	...	...	...	0	10	6
Sputum, Bacterioscopic examination ... ..	...	...	...	0	5	0
Biological test for Tubercle ... ..	...	...	...	1	1	0
Throat-swabs for Diphtheria (prepared swabs obtainable on application) :						
Bacteriological Report ... ..	...	...	...	0	2	6
Urine, ordinary clinical examination ... ..	...	...	...	0	5	0
Quantitative estimation of glucose ... ..	...	...	...	0	10	6
Biological test for Tubercle ... ..	...	...	...	1	1	0
Fæces, for Ankylostomiasis ... ..	...	...	...	0	2	6
Blood (collecting outfit obtainable on application) agglutination test for Typhoid (Widal), Paratyphoid, Malta Fever, etc.						
Malta Fever, etc. ... ..	...	...	...	0	5	0
Tumours and Morbid Tissue :						
Microscopic examination ... ..	...	...	10s. 6d. to	2	2	0
Post Mortem examinations ... ..	...	...	10s. 6d. to	5	5	0
Toxicological examinations ... ..	...	...	10s. 6d. to	21	0	0
X-ray examinations, blood-counts, etc., by special arrangement.						

The following sera, vaccines, etc., are issued at the prices indicated :—

	s.	d.
Anthrax Inoculation, per double dose of two inoculations	0	6
Anti-Diphtheritic Serum, per dose	5	0
Anti-Streptococcic Serum, per dose	2	0
Anti-Tetanic Serum, per dose	2	0
Mallein, per dose... ..	0	4
Tuberculin, per dose	0	4
Anti-Venene (for snake bites), per dose	5	0
Blue Tongue Vaccine, per 25 doses	2	0
Blue-Tongue Curative Serum, per 50 cub. c.	2	6
Quarter Evil Vaccine (in five and ten dose packets), per dose	0	3
Q. E. V., Double Inoculation, per dose	0	6

Appliances for inoculations, syringes, etc., are also supplied from the Laboratory.

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
Commissioner of Mines.

SOUTH AFRICAN STUD BOOK.

A record of all classes of Stock; the object being to encourage the breeding of thoroughbred stock and to maintain the purity of breeds, thus enhancing their value to the individual owner, and to the country generally.

Application for Membership and Entries of Stock should be addressed:—

For CAPE COLONY A. A. PERSSE, P.O. Box 703, Cape Town.
 „ TRANSVAAL F. T. NICHOLSON, P.O. Box 134, Pretoria.
 „ ORANGE RIVER COLONY .. E. J. MACMILLAN, Government Buildings,
 Bloemfontein.

THE SOUTH AFRICAN STUD BOOK

IS OBTAINABLE OF:—

T. MASKEW MILLER,
ADDERLEY STREET, CAPETOWN.

PRICE 10s. 6d.

A. A. PERSSE,
SECRETARY, SOUTH AFRICAN STUD BOOK ASSOCIATION.

➤ TEOSINTE. ✧

THE WONDERFUL FODDER PLANT.

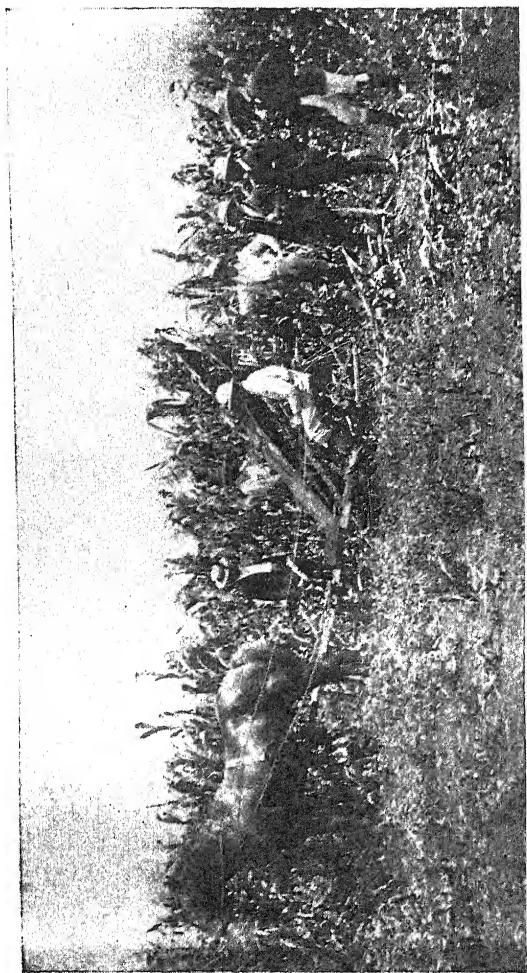
Grows easier than sugar cane and can be cut 12 to 15 times in one season. Plant it for your Dairy Cows, Horses, Mules and Pigs.
 Five pounds will plant one acre.

FRESH ACCLIMATISED SEED AT 1/- LB.

NOEL BROS., PINETOWN, NATAL.

STUD and STOCK.

P. D. KIMBER, MARITZDAAL, THE DARGLE.—Breeder of Yorkshire Coach Horses, Cleveland Bays, Hackneys, and Pure Breed Shetlands. Stallions, Mares, Young Stock, Saddle Horses, Remounts and well-matched Pairs always on sale. Young Horses selected privately trained to saddle or harness to suit purchasers. Also Breeder of Shorthorn Cattle.



MAIZE-HARVESTING AT CEDARA.

*The Natal Agricultural Journal.****Ostrich Farming.***

Is Natal a country in which ostrich farming could be carried on profitably over a considerable area? To most the answer to this question has appeared doubtful; to the minds of a few the matter is a settled certainty. Then why, one may reasonably ask, if ostrich farming has been found possible and profitable by a few, have not more farmers taken up this branch of farming? Why?—tell us why more branches of farming activity are not taken up in this country, and we will tell you that apathy is not absent among the farmers of Natal. We do not, however, say that apathy has been entirely responsible for the lack of progress which ostrich farming has made in Natal, but it is an element which has been present to a sufficient extent to be taken account of. To apathy must be added disinclination to take the initiative, or to risk where others perhaps do not appear to have adequately proved. To these considerations again, which have served as a bar to progress, must be added the discouraging and sometimes disastrous effects of want of experience and, when experience has not been wanting, of

“The slings and arrows of outrageous Fortune”—

which perhaps in no other ordinary sphere of human life are felt so keenly as in the sphere of the farmer—and no less in Natal than elsewhere. These adverse circumstances over which man has no control—hailstorms, droughts, untimely rains and untimely frosts, stock plagues, locusts and insect and fungus pests generally—serve from time to time as dampers upon the enthusiasm of farmers starting new branches of farming, taking up new crops and fresh forms of live stock, but their efforts are rarely so disastrous as to act as a complete deterrent against enterprise in farming. Considering individuals, we must put down a very considerable proportion of their failures, and so of the lack of progress in any given line of activity, to inexperience; considering the country collectively, we must to an appreciable extent place to the credit of apathy, and to an equal if not a greater extent to the credit

of unwillingness to incur risks in an unknown sphere, the little progress which often characterises the inception of new industries.

To ostrich farming in Natal as well as to other branches of farming these remarks apply. Ostrich farming has been carried on for many years in this Colony; it has been proved by, we think, all who have tried it an industry well suited to many parts of the country; yet at the present day the number of farmers who are carrying it on can be counted on the fingers of one's hands. The industry is a possible one: why is it not carried on more extensively? Our reply is: it has been *proved* a profitable industry for Natal, but it must be "*boomed*." "Show us," says the farmer, "by the force, not of one, but of many examples that ostrich farming *will* pay; tell us what crops to grow, and so what conditions of climate and soil are required; teach us how to manage ostriches, how to rear them from the hatching of the eggs to the marketing of the feathers; help us to start, and then we will help ourselves." First, then, we want the shining examples who are going to show that ostrich farming does pay—and they must be considerable in number in order that the lustre of their example may be the greater. This means, in other words, that we want a number of enterprising men to step forward and take up ostrich farming; there are a few who have been at it for years and who, we think we are right in saying, find it a no mean source of income: the example of these few must be followed by a few more, and the stimulating effect upon the farming community generally will be to increase interest in ostrich farming and gradually to establish the industry as one of the staple ones of the Colony. What crops should be grown, what conditions of climate and soil are required, how ostriches are managed and how the feathers are obtained and marketed: these things also the farmer must know. Information on these points—in fact, fairly full information on ostrich farming—has been published in the *Journal*, and we would direct attention in particular to the following issues, *viz.*: November 9th, 1900; August 23rd, 1901; and November 29th, 1901.

We have said that it is not sufficient to assert that ostrich farming in Natal is a sound proposition—even though the assertion is made upon the strength of the experience of half a dozen progressive men:—the proposition must be "*boomed*." That is to say, expert opinion upon the possibilities of the country should be obtained, the soundness of the proposition should be shown, and farmers should be encouraged in every possible way to invest in ostriches. This has been recognised by the Government, and accordingly, at the request of the Natal Minister of Agriculture, the Government Agriculturist of the Cape Colony, Mr. R. W. Thornton, who is an expert in all matters connected with ostrich farming, visited Natal in July for the purpose of reporting upon the possibilities of the Colony generally in the

direction of ostrich farming and the suitability of certain lands in particular for this branch of farming. He inspected particularly a considerable area of land in the Weenen and Umvoti counties; and his report, framed as a result of his investigations, leaves no doubt as to his opinion of those portions of the country as ostrich-carrying lands. All the lands he inspected he found eminently suitable for ostrich farming; the only drawback of any kind at all appears to be that at Weenen the heat is likely to prove detrimental to the health of late or out-of-season chicks. This, however—which, indeed, only applies to Weenen, which is notoriously hot—cannot be regarded as a serious drawback, and it does not exist in portions of the Colony where the heat is not so oppressive in summer.

Mr. Thornton's report is of a more or less confidential nature, and its publication would not serve any useful purpose so far as the readers of this journal are concerned. Throughout, as we have said, Mr. Thornton gives expression to his favourable opinion of the possibilities of the districts he inspected—which included Weenen, Nkasini farm, the Tugela River Irrigation Works, and the Mooi River Irrigation Works. Better expression of opinion—so far as the general reader is concerned—he gave in the course of his lecture before the Durban and Coast Society of Industry, on the 28th of July, after he had completed his tour of inspection. An account of this lecture will be found elsewhere in the present issue of the *Journal*. It will be seen that Mr. Thornton considers the thorn country along the rivers in the districts he visited to be as good for ostrich farming as, and better than, almost any part he has seen in Cape Colony.

There were a combination (said the lecturer) of conditions seldom met with except on a very small scale, at the Cape—that was land suitable for lucerne, a permanent water supply, and a suitable climate.

Mr. Thornton estimates that in the Tugela Valley alone some thousands of acres of land are suitable for ostriches, all of which land is capable of growing lucerne, and all of which can be put under irrigation. The financial side of the Colony's ostrich farming capabilities, as presented by Mr. Thornton in his lecture, cannot fail to prove attractive—and it will be seen that the position which Mr. Thornton described was not as bright as it would be in the case of an experienced man taking up ostrich farming in this Colony. Mr. Thornton gave a large amount of interesting and useful information regarding ostrich farming, and we commend the lecture to the perusal of our readers.

Thus for the present we leave the matter, but we shall have occasion to return to the subject later on; and we hope in the meantime to arrange for one or two interviews with gentlemen who are at the present time successfully farming ostriches, the results of which interviews will appear under "Traffics and Discoveries."

The Maize Congestion.

The congestion in the maize traffic at the Point has constituted an important but unfortunate feature of the export trade this month, forming a leading topic of discussion in the daily press. The causes out of which this unfortunate state of affairs has arisen have been several, but two main factors stand out as of prime importance. These two factors are (1) the consignment to the Point of wet mealies by the farmers of the Orange River Colony and the Transvaal; and (2) the neglect of the Durban exporting merchants to comply with the request of the Shipping Conference lines to notify them of the tonnages due for export and the approximate dates on which it was desired to ship. Of these two factors, the former is perhaps of the greater importance as a cause of the state of congestion at present existing at the Point. From the point of view of the Natal farmer, at any rate, no terms are sufficiently strong in which to condemn the action of those of our northern neighbours who have been consigning damp mealies to the Point. To Natal is due the credit for the inception of the idea of exporting mealies upon systematic lines; our farmers have risen to their opportunities, they have thoroughly grasped the requirements of the market, they realise the fact that our mealies secure top prices, being considered the best in the market, and they are doing their utmost to sustain the good name which Natal maize has taken for itself. Now they have the spectacle of hundreds of tons of O.R.C. and Transvaal mealies arriving in Durban in a wet condition that renders them unfit for export until they are properly dried, and occupying shed accommodation that ought rightly to be available for good, dry stuff, and as a result of the congestion thus brought about our farmers cannot get their consignments on the water and are experiencing delays and difficulties which are irritating, to say the least of them. The Natal farmer realises as much as anyone the importance of Durban's retaining the premier position she has held right from the first as an exporting centre, but he justly fails to see why he should be penalised by the downright neglect of farmers in the inland Colonies who appear so ignorant of the primary essentials of an export trade in grain as to rail damp maize to Durban for export.

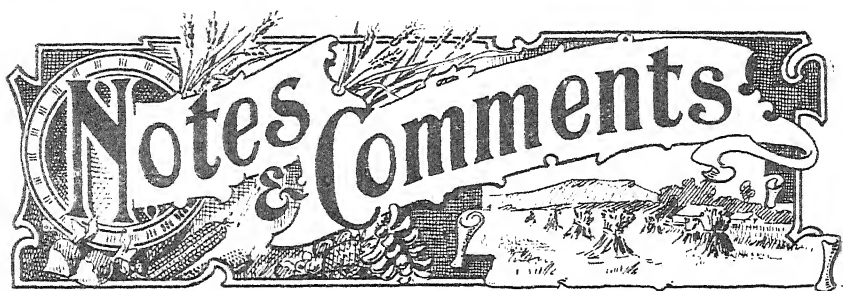
Much, however, as the failings of some of the farmers in the inland Colonies have had to do with the present state of congestion, some share of blame undoubtedly also attaches to the Durban merchants who are handling mealies for export. The Conference lines informed the shippers that they would be in a position to supply vessels if they would guarantee a certain tonnage. This the

merchants did not do, and the available shipping accommodation was accordingly far below requirements. At the last hour, almost, the merchants naturally requested the "ring" to allow them to ship by "outside" steamers if the Conference lines could not rise to the occasion. This for some time the Shipping Ring would not do—whether to teach the merchants a lesson or not it is impossible to say. The merchants would have learned their lesson in any case, however, and we cannot but censure the Ring for their action in delaying the concession asked for by the merchants. This delay meant further accumulation of stocks and further congestion generally.

The Government, as usual, has come in for a share of the blame, because there was insufficient truck accommodation. The Government, however, obtained assistance from the other Railway Administrations in order to cope with the increasing traffic, and at the same time cabled to England for further rolling stock for our lines. Whatever may have been the shortcomings of the Railway Department in the matter of truck accommodation, however, such shortcomings had nothing to do with the congestion at the Point, which was a matter of lack of shipping facilities combined with the impossibility of shipping damp grain.

Another factor which must be borne in mind in considering the causes of the maize congestion is that the great care which is exercised by the Government Grader at Durban in examining and classifying grain for export, combined, of course, with the excellence of the Natal mealie generally, has resulted in European buyers regarding with especial favour all maize shipped from Durban: shipment from Natal constitutes, as it were, a hall-mark of excellence. The result of this is that the O.R.C. and Transvaal farmers prefer to export through Durban, knowing that their grain, if it succeeds in passing the grader, will obtain top prices according to its grade; and the traffic as a result has been larger this year than ever, but the "block" at the Point has prevented things from going as smoothly as could have been desired.

Such, then, are the principal causes which have contributed to bring about the unfortunate state of things at the port during the present month. Fortunately, however, owing to the concession granted by the Conference Lines to the merchants, the congestion is, at the time of writing, becoming less severe, and it is hoped that matters will soon become normal once more. The chief persons concerned—the Durban merchants and the O.R.C. and Transvaal farmers—have learned a lesson, and there will probably not be a recurrence of this month's experience for a long time to come. The establishment of a clearing house by the Government, too, will go a long way towards preventing such a recurrence by arranging the shipments of grain and keeping the shipping companies informed well in advance as to the freight accommodation likely to be required.



Ramie.

THE cultivation of ramie in Natal is being hampered by the want of knowledge regarding satisfactory degumming processes and decortivating machinery. Announcements of new discoveries and new inventions are made from time to time, but thereafter little or nothing is heard of them; whether they prove satisfactory or not is not known: it is quite likely that the processes are kept secret and only a few individuals benefit, the operations being necessarily confined to a relatively small area of land; and in the meantime the world in general awaits the announcement of some discovery the "secret" of which will be placed within the reach of anyone who is sufficiently enthusiastic about ramie as to be prepared to spend a little money. Quite a simple degumming process is that lately elaborated by a Mr. Smith at Shanghai, the operation lasting only ten minutes; but in connection with this process, as with others, there is a "secret composition," which is added to boiling water in which the ramie stems are then placed and boiled for four and a half hours. We learn from a United States Consular Report, too, that a decortivating machine has also been invented by Mr. Smith, for which it is claimed that it will do the whole of the work now done in the field by hand with the exception of cutting and carting. It should be possible to get one of these decortivating machines, at least. So satisfactory, apparently, are the results that are being obtained that a fibre company has, we learn, been organised at Shanghai to manufacture ramie goods.

Grading Kafir Corn.

The General Manager of Railways announces that, in future, South African Kafir corn for export will be graded at the Port in the same manner as South African maize. $\frac{1}{2}$ d. per bag will be charged to cover this service. The grades are: Red, White, Black, and Mixed (F.A.Q.).

Experiment Station Notes.

Owing to the disastrous fire which took place at Cedara during the month, and pressure of work chiefly consequent thereon, the Director of the Division of Agriculture and Forestry has been unable to compile his usual notes on the work of the Experiment Stations. The main details of the work done during August will, however, be included in the September notes in our next issue.

Live Stock Insurance.

Some months ago we referred to an announcement which had been made that a live stock insurance association was about to be formed; and we gave at the same time some particulars regarding live stock insurance in Europe, the principles upon which European associations are run, and so on. Our readers will now be interested to hear that the association foreshadowed came into being some time ago under the name of "The South African Mutual Live-Stock Insurance Society, Ltd.," and has now begun issuing policies. This we learn from the July issue of the Bloemfontein *Farmers' Advocate*. We learn also from the same journal that, with the object of securing sufficient financial backing, the directors of the society approached one of the most powerful British Insurance Companies, viz., the "Yorkshire," who for many years have been actively engaged in live stock insurance business in all parts of the world, and they were successful in getting the "Yorkshire" to interest themselves by becoming shareholders and subscribing for a considerable number of shares. These negotiations were completed in May of this year, with the result that the Society is now firmly established, and is doing a large and increasing business in all parts of the country.

The rates have been carefully worked out, and, contrary to expectations, are very little and in some cases no higher than European rates. The policies issued are of a most comprehensive nature, and the Society quotes rates for special risks, such as for foaling, castration, transit by rail and at shows, etc., and though at present the Society is confining itself as much as possible to the animals entered in the Stud Book, it is also accepting risks elsewhere. The majority of animals insured to date have consisted of mares in foal, stallions, bulls and cows. A few policies have been issued for high-class imported rams, but at present this class of business is not sought after, though at a later date the directors hope to be able to accept risks on practically all classes of well bred and cared for stock. The Bloemfontein Corporation has now insured a large number of its animals with the Society, and

several other municipalities throughout the country are making arrangements to do likewise. Mules are accepted at the same rates as horses, and as the majority of the smaller towns use mules for their transport they will be able to take advantage of the Society's terms. A pleasing feature of the Society's career is the support it is receiving from the farming community, and if the directors continue on the present sound lines they have already initiated, we prophesy a great future for the Society.

"Farmer Boys' Pages."

The present issue of the *Journal* witnesses the inauguration of another new and important feature: the FARMER BOYS' PAGES, according to the title we have selected. Abundant testimony is now forthcoming of the growing feeling in favour of education of the youth of the Colony in the science and practice of farming, in order to fit them more completely for the intensive scientific farming which is gradually but surely superseding the old style of farming by "rule-of-thumb" methods, and which must be embraced by every young or prospective farmer who wants to make his way in the farming world of the future. Progressive farmers are more and more coming to realise this growing necessity; and whereas not so long ago the idea of reading as a path to knowledge in matters agricultural was ridiculed, the modern feeling now is that study—*combined, it is true, as far as possible with practice*—is essential to shorten the road to success and to increase also the measure of that success.

A proper scientific training can, of course, only be obtained at such an institution as the Agricultural College at Cedara, or under the supervision of competent teachers. Much, however, can be learned by reading and correspondence; and the daily press of the Colony has helped to some extent to further theoretical and practical knowledge of farming by its practice of devoting (in two cases, daily) space to the discussion of subjects of direct interest to the Colony, whilst the *Natal Agricultural Journal* is, of course, published solely in the interests of the farming population, and serves to a considerable extent as an educational medium. Hitherto, however, in the daily press and in this *Journal*, the interests of those who are not farmers but who want to become farmers, of those who have just started "on the land," who want elementary knowledge, who wish to become acquainted with the principles of agriculture—or rather, we should say, of farming—who, in short, want to *understand* as well as to *know*, have not received as much consideration as they need. Elementary articles have been published, but without system, and the articles have only touched here and there upon the vast subject of farming.

There has been an undoubted want of a systematised publication of articles of educational value starting with first principles and proceeding by definite stages through the various branches of the sciences of the farm; it has long been our desire to endeavour to fulfil this want; and we are now able to announce that, from the present issue henceforth, we shall devote a number of pages monthly to the publication of really elementary articles written upon a systematised plan, and of notes and paragraphs of interest to boys and young men who want to obtain some grasp of the science of farming. We direct readers' attention to these FARMER BOYS' PAGES; from men of experience and teachers we invite suggestion as to the improvement of the PAGES; from the younger generation we invite suggestions as to subjects upon which they would like to have articles more particularly, and from them also we invite inquiries and correspondence generally connected with their study. It is our desire to make these FARMER BOYS' PAGES as helpful as possible to those who want to learn, and we shall spare no efforts towards the attainment of that end. In conclusion we would ask all those of our farming readers who have sons working with them, or who have apprentices on their farms, to call the boys' attention to these PAGES and recommend them to their perusal.

International Veterinary Congress.

We are informed by the General Secretary of the Ninth International Veterinary Congress, which is to be held at The Hague from the 13th to the 19th September next, that the preparation of the Congress is in full swing, and that more than eight hundred participants from all parts of the world have had themselves registered as members, whilst many official delegates have been appointed. The meetings of the Congress, as well as the opening and closing sessions, will be held at Scheveningen in the rooms of the Kurhaus and of the hotels of the "Exploitiatie-Maatschappij Scheveningen." These rooms were already appointed for the purpose. On Monday, the 20th of September, the inauguration of the monument in honour of the late Dr. Thomassen, who died in 1906, will take place at the Veterinary School of the State in Utrecht. The excursionists will then go to the Northern Provinces of the Netherlands, where the most interesting towns and districts will be visited, and in some places cattle and horse shows will be organised for the members of the Congress. For those who wish to see another part of Holland, excursions to the Province of Zeeland are planned. A preliminary programme of the excursions is soon to be sent to the members. All particulars concerning the Congress will be communicated in a detailed circular which will be sent, in due time, to all the members, and which will likewise contain detailed descriptions of the towns and districts that are to be visited by the excursionists.

A New Patent Tin.

Manufacturers of fruit preserves, whether upon a commercial scale or in a small way on farms, will be interested to know that a new patent lever lid tin has just been placed on the market by Messrs. W. M. Morrison & Co., Ltd., of Anniesland, Glasgow, which is claimed to possess several advantages over the ordinary pattern of lever lid tin. The opening is the full size of the tin, whilst the top edge of the lid, instead of being left "raw," as in a slip lid tin or the present form of lever lid, is properly finished by "false wiring," leaving a smooth surface, which may be handled with perfect safety. As a result of the opening being the full circumference, there is naturally considerably less waste in using the tin, whilst the tin is more easily filled and emptied than is the case with the ordinary cans. The tin can furthermore be used when emptied as a mug, pan, or can, by affixing handles which are specially provided for the purpose by the makers of the tin. The tin (the patented name of which is the "Lan-ewen") can be closely "nested" for packing or export, as a 3-in. tin will go inside a 3½-in. one, and so on; so that they can be shipped keeping the ton under 40 feet measurement. This is evidently a form of tin which has come to stay, and which is likely to supersede many older forms.

Importation of Fruit from Cape Colony.

Persons interested in the importation of fruit from Cape Colony into Natal will doubtless remember the prohibition which was made by Proclamation No. 58 of last year against the importation of apples, pears, and quinces from that Colony on account of the prevalence there of the insect pest known as the codling moth (*Carpocapsa pomonella*). A further Proclamation (No. 57 of the present year) has now been issued amending the former order to the extent of withdrawing the prohibition in respect of certain districts of the Cape Colony which are now free from the pest referred to. Accordingly the provisions of Proclamation No. 58, 1908, will not henceforth apply to apples, pears, and quinces placed upon rail for Natal at any of the following stations on the Cape Government Railways, *viz.*:—*Sterksroom to Maclear Line*: Maclear, Inxu, Ugie, Gatberg, Xuka Drift, Maxonge, Elliot, Navar, Crimoria, Xalanga, Ulin, Ella, Ida, Embokotwa, Zinga, Indwe, Umblanga, Clark's, Dordrecht, Witte Hoogte, Koups's Leegte, Bird's River, Glen Wallace, Hasleton, Hazelmere, Penhoek, Klein Schuur, Sterksroom. *East London Line*: Putter's Kraal, Bombani, Bailey, Lesseyton Halt, Bowker's Park, Flower's Halt, Birch, Essex, Imvani, The Camp, Tylden Station, Tylden, Waku, Goshen, Cathcart, Gaika, Surbiton, Good Friday Krantz, Thomas River, Crow's Nest, Toise River, Littlego, Greytown Platform, Fairlie, Dolme, Stutterheim Road, Kalusie, Gazella,

Amabele Junction, Kei Road, Frankfort, Peelton, Blaney, Berlin, Lone Tree Loop, Fort Jackson, Egerton, Umdanzani, Ainalinda, Cambridge, Christehurst, East London. *Amabele—Butterworth Line*: Butterworth, Ndabakazi, Toleni Bridge, Eagle, Sihota, Spiral, Komgha, Prospect, Bleakmoor, Grays, Stockton, Ross Halt, Amabele. *King William's Town—Cookhouse Line*: Yellowwoods, Breidbach, King William's Town, King Halt, Leigeldt, Sekamos, Pirie, Debe Nek, Willmerton, Fort White, Middledrift, Ngwenya Halt, Redhill, Alice, Umdala, Fort Beaufort, Klu Klu, Kroomie, Adelaide, Primeston, Bedford, Request, Eastpoort. *Queenstown—Tarkastad Line*: Bowker's Park, Carl's Rust, Lehman's Drift, Waverley, Morning Sun, Tarkastad. *Grahamstown—Alicedale Line*: Grahamstown, West Hill, Coldspring, Atherstone, Highlands, Springvale, Alicedale. *Grahamstown—Kowie Railway*: Manley Flats, Blaauw Krantz, Martindale, Trapp's Valley, Clumber, Bathurst, Port Alfred.

Weights of Grain Bags.

Mr. P. J. Kroes writes to the Editor of the *Farmers' Advocate* as follows:—"Sir,—It is now laid down, that for the export of maize, bags must be used having a weight of $2\frac{1}{2}$ lbs. each, the exporter otherwise running the risk of his shipment not being accepted at the coast. I consider it my duty to draw the attention of exporters to the fact that they may have to weigh each bag separately, because the manufacturers of bags are not keeping to a uniform weight as will appear from the following: I ordered a small quantity of $2\frac{1}{2}$ lb. bags, and, whilst filling those bags, it struck me that the bags were very thin, and I decided to put them on the scale; I found that most of the bags weighed only from 2 lb. to 2 lb. and 1 oz. I returned the bags to the man I deal with and told him what I had discovered. He was immediately prepared to give me other bags, but before I accepted the new ones, I insisted that one out of the bale should be put on the scale. It appeared that this specimen weighed $2\frac{3}{4}$ lbs., and from the same bale I got my quantity. When filling these I noticed once more that the bags were not up to the mark, and consequently I returned them and decided to take a full bale of 300. The bale I bought was marked $2\frac{1}{2}$ lb. bags, and I thought I had got over the difficulty, but my ultimate experience was the same as before. Of the 300 bags, 105 weighed between 2 and $2\frac{1}{2}$ lbs. each. From the above it is quite clear that the manufacturers are very careless, and I hope that the disclosure of the above facts may put an end to it, in order that exporters may not suffer in future from such misrepresentations." It would be interesting to hear whether any Natal farmers have had similar experiences.

Mules from Argentina.

In order to alleviate the transport difficulties which farmers are experiencing as a result of East Coast Fever conditions in districts where the cattle have been decimated by this disease, the Government has imported a shipload of mules, numbering over 900, from the Argentine Republic, for sale to farmers. The mules were picked by Mr. James Piccione, and they appear to be a splendid consignment. The animals, after being examined by the Veterinary Department, are being sent up to two farms which the Government has hired for the purpose in the Camperdown Division, from where they will be issued to farmers. As announced in an official notice by the Under Secretary for Agriculture, the Department is now prepared to receive applications for these mules.

Hailstorm Insurance.

The question of the insurance of crops against the ravages of hailstorms has on several occasions been mooted in this Colony. The subject has been on the agenda paper of the Natal Agricultural Union; enquiries have at various times in the past been made of the Department of Agriculture by individuals regarding the feasibility of such a form of insurance; and the question has at various times been referred to by writers in the daily press. There are two ways in which the insurance of crops against hailstorm can be undertaken. One of these is by obtaining the financial backing of an ordinary insurance company. This method, however, is not worth considering in Natal for a long time to come—not until reliable statistics are forthcoming from which the frequency and extent of damage done by hailstorms in the various districts can be judged; for no insurance company will undertake the business until the risks are known. The alternative method—and, in our opinion, the only practicable scheme under present conditions—is that of co-operative insurance, each person paying in proportion to the value of his crops. This latter method we recommended in 1907, in our April issue (page 327). We suggested that at the end of each season payment could be made out of the funds in hand in proportion to the damage done by hail and in proportion to the funds in hand—the fund itself never being absolutely exhausted. We added that a guarantee to pay any definite proportion of damage done would probably render the association bankrupt the first season.

Whether or not it is that our suggestion made in 1907 has borne good fruit, we cannot, of course, say, but we are pleased to learn that a co-operative hailstorm insurance association has been formed in East Griqualand upon the lines which we recommended, the main idea of the

scheme being that payments in respect of losses sustained are only to be made to the extent to which funds admit—*pro rata*, of course. A description of the scheme has been furnished to his paper by the East Griqualand correspondent of the *Natal Mercury*, from which it appears that wheat, oats and barley cannot be insured for more than £2 10s. per acre; mealies, £1 10s.; other cereals, £2; and potatoes, £10; but the Society will accept no risk where damage to an insured crop is less than 10 per cent. Each member of the Society will pay an annual subscription of 10s., and the premium paid for insurance will be calculated on the following basis:—Wheat, 5 per cent. on the insured value of the crop; side and winter oats, 5 per cent.; Cape, Algerian, and Egyptian oats, 4 per cent.; barley, 4 per cent.; other cereals, 5 per cent.; mealies, 2 per cent.; and potatoes, 1 per cent. When a crop has been damaged by hail the insurer must report to the nearest assessor within 48 hours, and another 48 hours is given the assessor to make his report; but whatever compensation is given will not be paid until the end of the season, when the crop would have been reaped. Then, if the claims for damages exceed the funds of the Society, the claimants will be paid *pro rata*, after the working expenses have been met.

This plan of hail insurance we recommend to the attention of Natal farmers, who collectively suffer considerable loss every year through storms. It is the first practicable and feasible scheme ever adopted in South Africa; and it is just its practicability and simplicity, combined with the impossibility of bankruptcy, that must recommend it to groups of farmers who are desirous of instituting some scheme of insurance against the annual ravages of hailstorms. We hope to hear shortly that the idea has "caught on" in Natal also; at any rate we recommend it to the attention of farmers' associations, where the idea might be brought up at some of the monthly meetings.

Wattle Bark and the Tanning Industry.

We have received, through the Commercial Agent for Natal in London, a copy of the *Tanners' Year Book* for 1909, the organ of the United Tanners' Association of Great Britain and Ireland, compiled by Charles E. and J. Gordon Parker. The publication, of course, contains a large amount of technical information of no interest to readers of such a journal as this, but it also includes some statistics of interest to Natal wattle-growers, and there is also an article on "The Use of Mimosa Bark in Tanning Sole Leather," the conclusions of which have a special interest for Natalians. From the statistical tables we learn that the imports of mimosa bark from Australia into the United Kingdom (London) during the last seven years have been as follows:—

1902, 2,813 tons; 1903, 2,350 tons; 1904, 3,136 tons; 1905, 2,059 tons; 1906, 801 tons; 1907, 760 tons; 1908, 69 tons—from which it appears that we have little to fear in the future from Australia. This fact is more apparent when we examine the figures relating to imports from South Africa and study their magnitude as compared with the imports from Australia. The imports from South Africa, over the same period, have been as follows:—1902, 11,232 tons; 1903, 10,649 tons; 1904, 13,671 tons; 1905, 11,914 tons; 1906, 8,461 tons; 1907, 15,822 tons; 1908, 15,964 tons. The imports of valonia, gambier, and myrabolams last year amounted, respectively, to 5,266 tons, 829 tons, and 2,061 tons. It is interesting to note that, according to the table which is given of imports of tanning materials into Liverpool, the consumption of extract has not lately been on the increase. The imports during the seven years 1902—1908 have been as follows:—1902, 29,000 tons; 1903, 30,000 tons; 1904, 32,000 tons; 1905, 36,000 tons; 1906, 42,000 tons; 1907, 43,000 tons; 1908, 43,000 tons.

The *Year Book* also contains, as we have said, an article on "The Use of Mimosa Bark in Tanning Sole Leather," in which the author gives the results of careful experiments he has carried out with wattle bark (apparently principally Natal). A summary of these results should prove instructive to readers interested in wattle bark production, and we accordingly give the "general conclusions" which the author himself has drawn up. He says:—"The experiments as a whole seem to show that mimosa bark is an excellent tanning material for the sole leather tanner, but that it should always be blended with other materials for both economy and convenience. It is highly probable that a blend of mimosa and myrabolams would yield an excellent result. The myrabolams would introduce the mellow tan that is needed in all tannages; it would give some souring properties to the tan liquors, have a beneficial effect on the colour and the goods both in the early stages of tanning and in finishing, and would probably improve the weights and general quality of the leathers. -----

"Mimosa bark would seem to be beneficial even in moderate quantities in the ordinary mixed tannage, in freshening up too mellow liquors on account of its astringency, as a filtering material in the leaches on account of its non-production of bloom, and as a dusting material on account of the stability of its tannin and the readiness with which it spends. It would also seem that mimosa bark was a promising material for the extract manufacturer on account of the ease with which it spends. A blend of the readily soluble tannin with, say, five per cent. myrabolams, would probably make an excellent extract for strengthening the layer liquors, and it is possible that a profitable sulphited extract might be obtained from the difficultly soluble tannin."

O.R.C. Maize Competition.

With reference to the announcement appearing on page 107 of our June issue, Mr. C. McG. Johnston, the secretary of the Bloemfontein and O.R.C. Agricultural Society (Box 77, Bloemfontein), writes us as follows:—"With reference to the advertisement of mealie prizes which has been offered by this Society at the 1910 show, March 22nd-24th, which prize you so kindly inserted in your *Journal*, I have received a considerable amount of correspondence from Natal farmers. They raise the point that their 1910 mealie crop will not be ready to compete for this prize. Would you be good enough, therefore, through the medium of your *Journal* to draw their attention to the fact that we are prepared to accept entries and certificates of this year's crop, which they are now harvesting. In fact, that was the reason why we advertised this special prize so long before the show."

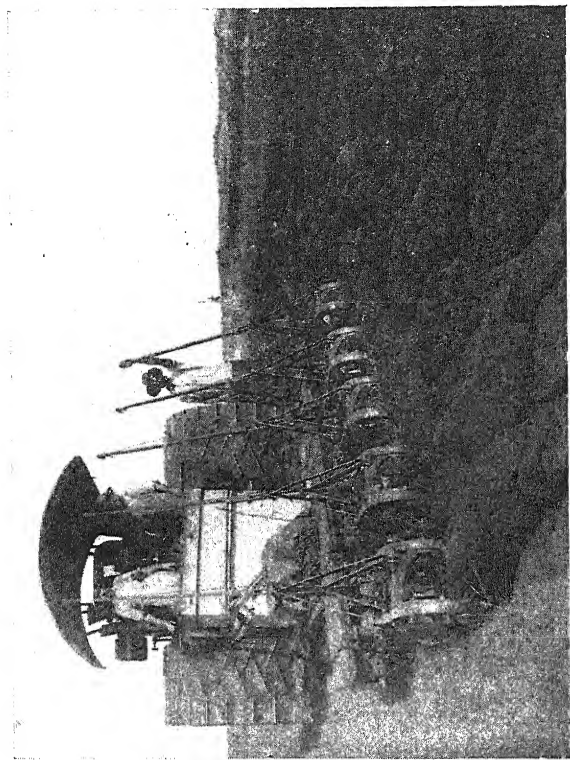
Fruit Drying.

A correspondent writes us as follows:—"Twenty-nine thousand one hundred and forty pounds worth of dried fruit, exclusive of dates, were imported into South Africa during 1908. £29,140 could have been saved the country, as there is an abundance of fruit. Only a small percentage of the importation comes from Great Britain and the Colonies, the bulk of the remainder of £24,869 comes from the United States, and, considering that the fruit from that country comes from as far as California and has to be sent 3,000 miles by rail to New York and from there by steamer, it is astounding to find farmers in this country neglecting such a valuable industry. That good stuff can be produced with care and proper management has been fully demonstrated at the various agricultural shows during this year, the dried fruit exhibited being in no way inferior to the imported article, and these shows ought to influence the farmers to do likewise."

Many farmers complain that they do not know what to do with their surplus crops, as the prices obtained at the chief markets of South Africa are often unsatisfactory owing to the large quantity of fresh fruit coming forward, and apparently there is not sufficient demand. Other farmers complain that it does not pay them to send the fruit to the nearest market as the fruit gets too bruised over the bad roads, and they therefore prefer to let it rot on the ground, yet by drying it in a proper manner, they could turn this all into money and have a good return for their trouble and outlay. It is, of course, quite useless to think of success if the fruit is dried in the sun and simply bagged. Stuff of this kind finds no favour because fruit dried in this old-fashioned manner

has no tempting look about it, apart from the maggots, which soon make their appearance, as, during the sun-drying process, countless flies are attracted and deposit their eggs on the fruit. The bags, always more or less dirty, allow the dust to come in freely and the fibre sticks to the fruit, which is very objectionable. In the first instance the fruit has to be sorted, as no bad ones must be used, then fruit like apples, pears, quinces, etc., must be peeled by proper fruit-peelers, and if apple rings are to be made a combination parer is used, which peel, core, and slice the fruit, all at the same time. Apples darken almost immediately after being peeled, and this can be avoided by dropping the fruit into water in which a little salt has been dissolved. The packing must be done in a neat manner, paper-lined boxes of uniform sizes all containing equal weight must be used, and the contents and net weight must be stencilled thereon.

The drying must, of course, be done in evaporators, which require no particular skill and which can be attended to by farmers' wives and daughters, who only need from time to time to change the trays and refill them. Small evaporators with a drying surface of 8 and 10 square feet can be used on any ordinary cooking stove whilst cooking is going on. Such small evaporators are in use in nearly every farmhouse on the continent of Europe, whereas owners of large orchards invest in evaporators which have a drying surface of 20 to 60 square feet, with 12 to 20 interchangeable trays and mounted on specially constructed stoves, which may be used inside or out in the open. A large evaporator dries about 105 lbs. of apples in 12 hours, and uses, during that time, about 30 lbs. of coal, or an equivalent of wood, so that the cost of production is very small. The peels of oranges, citrons and pampelnus, after having been boiled in sugar and dried in an evaporator, are best known as "candied peel." Ordinary pumpkin treated in a similar manner is turned into a very palatable "konfyk." Watermelon konfyk is dried to perfection in such evaporators, as well as candied fruit of any description. Vegetable farmers, who get only a small return for their produce in the height of the season, can do better by drying their surplus. Dried vegetables, like French beans, peas, cauliflower, etc., will find a ready sale when nothing else but fresh cabbage is obtainable, and will be found to be an excellent addition to the otherwise monotony of the table, as they are nearly equal to the fresh article. These are soaked in water a couple of hours before boiling and then treated as the fresh vegetable. Herbs of any kind may also be dried, as also onions, tomatoes, potatoes, all of which are articles of enormous demand in other countries, and farmers will do well to pay attention to this.



THE JOHN DEERE STEAM PLOUGHING OUTFIT.—I.

Ten furrows cutting swath 1 ft. 8 in. wide ; 2 and 3 acres per hour.
(See Article.)

The John Deere Company Steam Plough.

By LEONARD ACUTT, J.P., Tongaat.

MOST of us are now familiar with the working of steam ploughs, as there are several at work in Natal, some of them introduced by private enterprise, and two by the Government with the view of assisting the farmers in the (well nigh) crisis which has been reached by the loss of draught oxen by the Tick Fever. These steam ploughs are mostly those supplied by John Fowler & Co. and are worked by two engines, one on either side of the field to be ploughed, across which the ploughs are pulled by wire rope. The working of this type of plough was described by me in an article written for the *Journal* in May, 1908, entitled "A Visit to Vereeniging."

There are besides these Fowler ploughs some few small plants of traction ploughs, but the importation and working of a full-sized Deere Company's 10-furrow plough marks a new era in agricultural progress in Natal.

I accepted an invitation from Messrs. Morris Bros., of Empangeni, to witness, not a trial, for the machine has already ploughed over 100 acres, but a demonstration of what the plough can do under ordinary working conditions.

Messrs. Morris Bros. are mechanics, and arrived in Natal with their father, Mr. George Morris, J.P., of Durban, in 1882. Mr. Morris, sen., was in the sheet metal line, his place of business being in what was then known as "Baxter's Passage," now School Lane. About 1906 the sons went into partnership with their father under the style or firm of George Morris & Sons, their place of business being in Williams' Road. The business included many branches, among which may be named electro-plating and the making of galvanised corrugated iron tanks for mealies and water.

The business was closed down in 1906, and the sons, Messrs. P. B. and G. H. Morris, who had always a leaning towards country life, took up, from the Government, the land which they are now working with their new importation.

The farms are Nos. 171 and 172, Zululand Coast Farms, and are situate close to Empangeni Railway Station, and have a long frontage to the Natal Government Railway. The farms are together in extent some 1,000 acres. The soil is apparently a deep red loam, carrying "insindi" grass.

The farms are outside of the line within which arrangements have

been made with Sir J. Liege Hulett to crush all sugar cane grown, and, therefore, until further factory power is provided, the farmers outside the line will have to look to other crops, and Messrs. Morris Brothers are devoting their attention to mealie-growing, and are preparing 250 acres for this season's planting, and intend very soon to have all their available land cultivated and be on the look out for "fresh fields and pastures new," as their steam plough will require a lot of land to keep it at work even half the year, and far more than the 1,000 acres or so which they now control. This neighbourhood is filling up rapidly. Mr. Frank Fynney and his son have taken up the adjoining farms to Messrs. Morris Bros., and Messrs. Andrews, Brookes and Logan, from Greenwood Park, are taking up their allotments, and work will probably be found for the plough on these lands when Messrs. Morris Bros. have done their own work, and we may expect to see a very large acreage of mealies growing in this district in a few months' time, the local demand for which staple is very great, and fair prices should be obtained without going to the cost of railway carriage.

The fondness of the Messrs. Morris for mechanics is evinced by the work they have put into their houses and other buildings, which are all most complete, and wherever the work of two willing pairs of hands could add finish to substantial work it has been put in.

The dwelling-house is most carefully fitted with wire gauze frames to doors and windows and all openings. The machine-shed is a large building, and contains a lot of machinery and tools, disc harrows, mealie planters and every machine calculated to save labour, and over all neatness and order reign.

Messrs. Morris Bros. have had the question of steam ploughing under their consideration for some years, and, from their reading, but mainly perhaps on advice received from a brother in Canada, where the Deere plough is largely used, they decided to import a plant from America.

The engine, which travels on the land, pulling the plough or ploughs, is a Reeves steam ploughing engine, double cylinder, 32-h.p. nominal, 96-h.p. indicated; width of driving wheels 3 feet, diameter 6 feet 2 inches. Working pressure 140 lbs. to square inch. Engine fitted with both injector and feed pump and super-heater. Boiler of ordinary locomotive type.

To the engine is attached a platform which is on three plate iron runners about 10 inches wide. In some of the plants now being made wheels are being fitted in place of the runners.

This platform carries a water tank and coal supply.

The coal used in a day's work is from 1,500 to 1,700 lbs.

The coal costs from 20s. to 24s. per ton at Empangeni.

Somkele coal was used at a cost of 13s. per ton, but none is now obtainable.

About 2,000 gallons of water is required per diem, and this is brought up from the well in a tank wagon drawn by ten donkeys; the water is drawn from the wagon tank to the tank on the platform by a steam syphon, and the taking in water causes very little delay.

To the platform above mentioned the ploughs, or "bottoms," as they are technically termed, are attached; these are 10 in number, in pairs, and are raised or lowered by the operation of five levers. The ploughs are not rigidly fixed to the platform, but are attached by a hinge arrangement, so that they are only kept in the ground by the hold they have of it, added to their own weight.

The ploughs have the high arched beam which we know as the "Cockshutt," but is called the John Deere big engine gang 10-bottom plough.

This arched beam enables the ploughs to go through foul land without becoming choked, the arched beam allowing the rubbish, grass, roots, etc., to clear. Each plough is fitted with a disc coulter; this coulter acts as a safeguard against stones or stumps, for in riding over such obstacles it lifts the plough out and drops it again when clear of the obstruction.

The levers operating the five pairs of ploughs are worked from the platform, and, on the outfit reaching the land to be ploughed, the levers are worked by a white man and a native and the ten ploughs take the ground practically at the same time.

The land which was being ploughed on the occasion of my visit was fairly level ground, the turf short, and, in fact, all the conditions were most favourable.

The depth of the cut was 5 or 6 inches, and this is quite deep enough for land which is to be planted this season. The width of cut is about 14 inches per plough.

After this ploughing the ground will be disc harrowed, and should then be ready for the mealie planters.

The machines turned over an acre in 19 minutes while I was on it, and this in spite of a very long turn at the headland and a stoppage to clear the ploughs of rubbish in going over where an ant-heap had been cleared; and, from two or three hours' observation of the outfit under working conditions, I came to the conclusion that, given that the land was properly prepared, a 10 hours' day should result in from 25 to 30 acres of land being turned over, or, if we put the average day's work at 20 acres, this should mean 100 acres per week. One day a week is always required for a thorough clean and overhaul.

The working expenses of this result would be per week:—

	£	s.	d.
Two white men, 15s. a day	9	0	0
One native, 1s. 6d. a day	0	9	0
One wagon and span for water	6	0	0
Five tons coal at 24s.	6	0	0
Oil, sundries, etc.	1	10	0
	<hr/>		
	£22	19	0

To which must be added wear and tear and upkeep, spares, etc., of plant. At any rate, the cost of ploughing 100 acres, which can be done in a week should not be heavy.

I quite realise that the plough was working under very favourable circumstances, and I should like to see it at work on land which had been cultivated. Still, when one bears in mind the usual firm condition of ordinary land after a crop of mealies has been taken off, one cannot suppose that the engine could not get a grip of such land, and if the engine can grip there is no fear but what the work will be done.

It will, of course, be understood that the ploughs are not reversible, but rigs have to be laid out and the sods "cast" or "gathered," as is done with ordinary ploughing with animal power.

A fairly wide headland is required, at least 60 feet. The engine is to all appearance as solidly built as English engines, but the ploughs have the regulation light American appearance, and there will doubtless be more fractures than with the English ploughs, but the parts are easily replaced in case of damage and at small cost, and we must, in looking at agricultural machinery from America, always remember that the leading idea with Americans with regard to vehicles and machinery is, that it is better to have a breakdown occasionally than haul about a large amount of dead weight.

The cost of the outfit landed at the Point is about £1,500, and the weight 27 tons.

I wish particularly to avoid any expression of opinion as to the comparative merits of one type of steam ploughing plant over another, but I may say that this "Deere" plough plant is quite unsuitable for the work now being done by "Fowler's" ploughs on the stiff soil and hilly country at Mount Edgecombe and Tongaat. For more undulating land, such as the Cato Ridge and Camperdown soils, the "Deere" outfit will do good work, and anyone going in for steam plough cultivation in undulating country should study this new importation, both as regards its suitability for the work, cost and working expenses.

This machine, though being of reasonable cost, is still not within

the reach of the average farmer, and a plant at half the cost, and with half the working expenses, would be a boon to South Africa, where animal life is so precarious.

Messrs. Morris Bros. are to be congratulated upon their enterprise; they have done a public service, and deserve the special consideration of the Land Department when they require more land, which, with this powerful machine to find work for, they will assuredly do before long.

The possibilities before the Empangeni district are enormous. I am informed by those who know this part of the country well, that all that great stretch of land up to, and behind, the Lower Umfolosi Magistracy, perhaps 25,000 acres in extent, is for the most part suitable for the growth of mealies and sugar cane, and let intending settlers be assured that they can get their first ploughing done at reasonable cost, which is in view with this plant in the neighbourhood, and the district should fill up rapidly and become a large mealie-producing centre, with the larger outlook in some years' time of planting sugar cane, when factory power is assured.

It is safe to say that, although Messrs. Morris Bros. have been late in getting their plant in working order, the result of their importation will be, that at least 1,000 acres of mealies will be planted this season, a very small part of which area could have been got in had the farmers relied upon animal power.

Intending mealie farmers should pay a visit to Empangeni to see for themselves.

Messrs. Morris Bros. will always be willing to show them the plant and the work it is doing, and besides the trip through the rich sugar-growing districts of Zululand is a pleasurable one, and, to those passing through for the first time, an object lesson.

Sitting down and waiting for something to turn up may be poor policy; however, that's how the hen gets her chicks.

The only way to gain a profit in any business is to pay strict attention to the care of it. This applies more to poultry than to any other business.

Tea in Natal.

By "ANGLO-INDIAN."

TWELVE months in Natal tea, after nine years field and factory in Ceylon, has led the writer to believe that any comparative remarks as to its cultivation and manufacture would interest those concerned, and it is taken into consideration the limited supply of labour the Natal tea farmer has at his command. But, making all allowance for this, one ventures to think more could be made of the existing areas under tea both as to yield and quality: a far more important consideration, as Natal has not the sole monopoly of the South African tea trade even with the benefit of a fourpenny tea duty, which is not likely to be increased.

It is an undeniable fact Natal teas have a strong *growing* prejudice against them, which is being increased by the enterprising advertisements of foreign dealers. He is well aware that an average good Indian or Ceylon Pekoe or Pekoe Souchong tea can be bought wholesale in London or Colombo markets at from 6d. to 7d., which, in respect of quality and strength, certainly in flavour, is equal to, if not better, than Natal Golden Pekoe retailing at 1s. or 1s. 2d. It certainly goes farther. The liquor, though perhaps lighter in cup, is clear, pungent in flavour, and strong.

Natal growers have to compete with these, not by the cut-throat policy and sop of extravagant discounts, but by giving the public a better tea for the same money, which can be done by a more systematical system of plucking and pruning and the exercise of considerably more care in the various processes of manufacture. The imports of tea amount to 1,598,145 lbs., against a total Natal output of under 3,000,000 lbs., and yet the Natal producer has recourse to cutting his prices to secure buyers!

There is something wrong somewhere. Tea is not a crop like mealies to be hastily gathered and stored. On the contrary, from the day the tea comes into bearing till manufacture is finished, field and factory work demand most unremitting attention and the bush looked upon as a source of an indefinitely continued annual income, possibly an increasing one.

As manufacture may be of most interest, we will start with "withering." The bulk of Natal's tea crop is gathered in a few short months, and withering accommodation for this is nearly always insufficient. Nine square feet of space should be allowed for every pound of green leaf.

A good wither is absolutely essential to make a readily saleable article, and when leaf comes in fast, and is spread inches deep on the floor or racks, it does not "wither," but rots or discolours. Tea made from this, with every care in the subsequent processes, has a common taste, greenish mixed outturn, and other undesirable points possessed in common with a good many pure Natal teas.

In India and Ceylon, where accommodation *used to be* insufficient and the importance of the above operation realised, open sheds were erected and fitted with jute hessian racks. The cost of such buildings with unsawn timber, roofed with iron or thatched is inconsiderable, and during any rush of leaf are utilised for surplus leaf. Naturally the wither is not so rapid as in a heated factory, but a natural wither is the best in ordinary circumstances, and makes good tea.

A word here as to racks. It is quite unnecessary expenditure for these to be made to roll up or tilt in order to remove leaf. Both methods have been thoroughly tried. They are ever getting out of order and sagging, which allows the leaf to collect and lie in heaps which remain partially unwithered, causing unevenness throughout manufacture. Light tapping under the jute rack with a 3-foot light rod made with a forward drawing movement will remove every leaf infinitely quicker than by aforesaid patent methods and is not so hard on the wear of the jute.

Well withered leaf is quite flaccid: a handful pressed adheres together, and the leaf is light green with the tips bright and silvery. Occasionally, owing to climatic conditions or other causes, the leaf threatens to *dry*. Should there be a probability of this the racks should be lapped under both edges towards the centre and the leaf thickened thereby. When spread on the floor this is impossible without undue handling of the leaf itself. This causes "reds" in made tea.

All glazed windows in withering lofts should be lightly whitewashed to prevent sunlight striking directly on the leaf, which also causes reds and spoils the flavour besides. Open sheds have their sides shaded with rough jute curtains to be let down when the leaf is spread.

Leaf if weighed after a good wither will be found to have decreased about 40 per cent. in weight, sometimes more. It should not be less.

Never allow coolies to tread or bruise leaf; this will give reds. Also do not have the withered leaf lying in heaps awaiting rolling. It will get heated and the flavour spoilt. If plucking is coarse, wither is bound to be uneven.

Rolling and Rollers.—Between the recent types with pressure gearing, Jackson's "Economic" and "Rapid," Brown's "Triple Action" (old type), there is little to choose, though with Brown's latest considerably

more pressure can be put on, but this necessarily requires a powerful motor.

With any, however, the full amount of its advertised capacity is never charged or any machine worked at a speed of over 40 to 45 revolutions per minute. Rollers worked faster than this do not roll; they *tear* the leaf into unrecognisable fragments, but detected by the expert by the presence of red "flake" mixed with red wiry stalks (the mid-rib of the coarser leaf) in the fine made tea, and the infusion is characterised as very mixed.

Well-withered leaf gradually acquires a twist during the first roll at a speed of 40 to 45 revolutions per minute; over this spread the tip and fine leaf will get spoilt, broken up into dust and lose flavour by mixing with the juices of coarser leaf; it is a hash up in fact, and should *never* be attempted at either high or medium elevations, however fine the flavour of the particular estates' tea may be. One such shipment would mean the loss of their usual buyer.

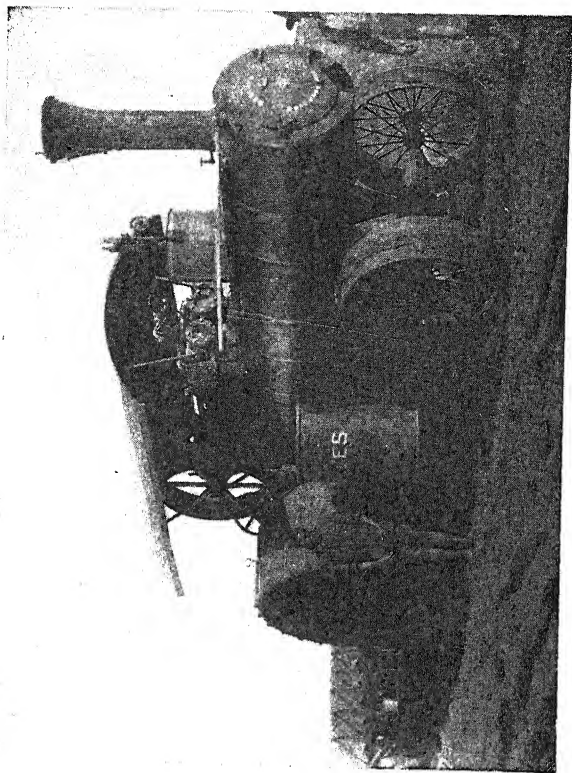
The objects of rolling are: By the first and second rolls to separate the fine tip and leaf from the hard stalks and coarser leaves in order that when the whole is passed through the roll breaker and sorter the fine will separate for treatment during fermentation, firing, and sorting. If carefully rolled the bigger leaf does not separate from the coarser fibres, but twists and considerably modifies the number of "reds" in the finer grades.

For the second roll only what may be called half pressure should be put on, and that even lifted two to three minutes in every ten to admit as much cool air as possible, preventing undue heating and consequent loss of flavour.

The third or subsequent roll (roller accommodation permitting) when full pressure is put on (with the same precaution) is to bruise the cells of the larger leaf as much as possible, thus rendering their contents readily soluble when infused.

The usual periods of the three rolls are: First, 25 to 30 minutes; second, 30 minutes; third, 30 to 35 and even 40 minutes. Some estates give the big leaf even a fourth of 25 minutes prior to rolling to take up any twist it may have lost while lying fermenting.

Before proceeding further, it would be well to still opposition to what will certainly be called unduly prolonged rolling by tea-makers in Natal, by pointing out that the aforementioned objects cannot possibly be performed in one operation, and also that if the rolling be properly carried out, *i.e.*, slowly and with attention to the pressure gear, no loss of flavour need be feared. Estates where the highest priced tea comes at elevations of 3,500 to 6,000 feet regularly pursue this system in a climate similar to Natal, and yearly show a market average from 9d. to



THE JOHN DEERE STEAM PLOUGHING OUTFIT.—II.

The Engine.

(See Article.)

11d. per lb. all grades in. It has another undoubted advantage: Well-rolled leaf is easier to sort into the respective grades with the least use of the cutter or equaliser. The best of these greys the leaf. Good rolling twists the leaf in its wet state, thus preserving the bloom and minimising the percentage of dust produced.

Possibly there are advocates of the one roll and almost immediate firing. To these it may be asked: What percentage of the lower grades, *i.e.*, Pekoe Souchong and Souchong do they produce, and its highest valuation?

In the first place this tea is not a true black tea, but may be classed by the trade as Oolongs, and poor at that. The existing flavour with Natal plucking does not warrant this treatment, and, secondly, they do not meet the popular demand for a full flavoured liquor or go as far as the imported article prepared on lines similar to above, *carefully* prepared and sorted and sold for less on the London market. Should there be a sufficient local demand for this class of tea it might be an experiment worth trying for estates with insufficient withering or rolling power to produce a *bona fide* Green Tea with part of their crop. A boiler and steamer would be the only machine necessary in addition to their existing machinery, and during a heavy rush surplus leaf might be made into Greens, and perhaps sell better than improperly manufactured black tea. This is done by some well-known growers in the East for the American market.

Roll Breaking and Sorting.—This machine and its work requires every attention. It should not only break up lumps of leaf but completely sift the *fine leaf only* from the bulk as taken from the roller. Often too much bold leaf is abstracted, and, needless to point out, this has not received sufficient treatment in the roller if it comes through after the first roll only. It will show greenish in infusion, besides weakening the liquor, its cells having been left intact. The circular revolving roll breaker is little used now. Brown's, Walker's, etc., all with the horizontal motion and revolving paddles in receiving box do the work well and quickly, and are fitted with No. 4 size mesh, the slope of which can be altered to suit requirements.

After every period of rolling, leaf is put through as quickly as possible, and the fine siftings of first, second and third rollings put apart to ferment and fire separately.

The breaking up in roll breaker materially assists in keeping leaf cool.

Fermentation.—Messrs. Mann and Kelway Bamber, scientists appointed by the Government of India and Ceylon, have made deep researches as to the actual changes that occur during this period, and their works on the subject may be obtained; but for practical purposes—the

wither and rolling having been satisfactory—the leaf is spread on the trays or floor in the fermenting room set apart for the purpose in the coolest part of the factory, and not more than four inches thick. Cover with a damp cloth; the fine leaf sorted to be kept separate from the big bulk, as it reaches the correct stage for firing sooner.

The ideal ferment shows this of a very fairly even bright yellowish brown, which will develop when placed in the drier into the darker “coppery” outturn so much desired by tasters. No fixed time can be laid down for fermentation. The right stage is better arrived at by sight, smell and experience. Some days leaf will never colour nicely, getting dark or remaining greenish. It is better to start firing such leaf about 2 to 2½ hours after rolling, counting from the time it is first put in the roller. The firing of the big bulk may be proceeded with immediately this is finished. Large leaf never or seldom colours evenly, also leaf from fields which have run long from pruning and small leaf *Jat* (kind) of tea bush. The indigenous large-leaved kinds as Manipur and Assam varieties always give best outturns, more pungent and strong liquors with a maximum of tip besides, being easier to make good tea of in every way.

One caution Messrs. Bamber and Mann are unanimous about: The cleanliness of all machinery. Roller, breaker and fermenting cloths should be washed every day. In some factories a mild solution of permanganate is used. Fermenting cloths especially quickly get tainted and spoil tea, and it would be better without them than dirty. To ensure perfectly cleanliness one or two factories in the East have gone to the extent of using glass or marble ferment shelves, but polished cement well looked after is expensive enough and efficient.

A free current of cool air should be allowed to play over fermenting leaf, and a light, damp blind over windows is used on close days, sometimes arranged so that a continuous drip of water falls on them and a cool, even temperature not above 70 degs. Fahr. maintained, the cooler the better.

Firing.—Drying the fermented roller leaf is an operation for which constant supervision is imperative. The latest machines for the purpose have been designed with a view to rendering the process practically automatic, but none are really so when entrusted to the care of the Indian labourer with his ideas of time and temperature.

The latest machines have an arrangement of flues by which the leaf is, when put in, subjected to an initial temperature of about 220 degs. to 230 degs., which instantly checks fermentation, and slowly finishes at 180 degs. to 190 degs., a much-to-be-desired system as this lessens the chance of overfiring. In this connection a caution may be impressed upon Natal tea-makers. Most of the earlier driers have furnaces more

or less designed for wood fires, which are much slower than the coal used locally, and this fact seems to be overlooked, judging by the frequency one tastes overfired, brisk or burnt tea. With old machines, where no provision is made for temperature, this should never exceed 190 degs. to be on the safe side. The large automatic endless tray arrangements like the Paragon do not seem suitable for fine leaf, and **firing** is mostly done by the smaller machines, as the "Sirocco," "Venetian," and "Desiccator," as small leaf even with every care gets frequently overfired in the big machine.

With all types a measuring box containing a fixed (approximate) quantity of green leaf for the respective machines should be used and the coolies kept from heaping up and "stewing" the leaf under a mistaken idea they are hastening through the work. Leaf thickly spread loses all "point" and pungency, while the topmost leaves and the lowest get overfired and taint the rest.

Fine leaf should be fired first and separately from big bulk. Mixed, it may be assured that fine tea will be burnt by the time coarser leaf is "done," or this leaf will be taken out only partially fired when the fine is ready. Fermentation consequently continues and leads to musty and mildewed tea if occasion causes it to be kept for some time in bins. In the East teas are never kept in store over one month and are always fresh. Charcoal firing undoubtedly tends to preserve the flavour of tea, and, some well known men maintain, even causes it to improve by keeping: certainly no machine-made teas can come up to the old primitive "chula" or charcoal oven-fired teas, though efforts have been made with present-day machines to introduce sufficient carbonic acid gas fumes to preserve quality by means of charcoal burning braziers placed at the draught inlet, but the drawing power of the fans is so great that the amount was practically ineffective. A new machine burning coke or charcoal has, however, been introduced and meets with excellent reports from users, and prices show improvement.

Well-fired tea is best judged by the feel, and, of course, overfired tea is at once detected by smell when the furnaces are lowered immediately and all doors opened. The feel should just be crisp with a very slight spring in whole leaf. Coarse stalks cannot be fired with tea. These might with advantage be eliminated by the pluckers. Very quickly dried tea loses the fine shade of gold in the tip, and is nearly always brisk. Tea for dispatch should always be re-fired. This is generally done at about 180 degs. and packed just warm. Re-firing is always done no matter how recently the tea was made.

Sorting.—The machine generally in use on up-country estates with the smallest pretensions to possess flavour is the horizontal motion-sifter, fitted with Nos. 24 or 30 to remove dust. No. 12 for Broken

Pekoe (or Golden Pekoe, as this grade is known in Natal), No. 8 for Pekoe, 6 for Pekoe Souchong. The sorting should be done the day after manufacture to allow the leaf to cool and get crisp.

Natal growers have their own particular buyers to accommodate and the sifting has to be done to suit requirements, but the percentages with good plucking work out in Ceylon and India, with above-named sieves, Broken Pekoe about 30 per cent., Pekoe Souchong 20 to 25 per cent., Souchong about 15 per cent. Tea when sorted is never allowed to lie about but immediately stored in air-tight zinc bins. If left open tea is quickly affected by moisture, which it readily absorbs and loses its keeping qualities and flavour. No re-firing will remedy this. It may be well to mention that an undue proportion of Broken Pekoe is never attempted. It is artificial and apparent in the greyness of the sorted tea, being choppy and mixed in outturn.

The high priced Indian and Ceylon Broken Orange Pekoes cannot be attempted with the general plucking of the poor average quality of the small leaved *jat*. It has been found the greatest of mistakes in the earlier days of planting to put out inferior cheap seed or seed plucked from tea in production whatever may have been the original kind, Assam or Manipur. The seed gets deteriorated by hybridisation and other causes. Not only is the yield slow and of inferior quality with little tip and hard leaf, but the bushes take longer to come into bearing. With a good *jat*, flush comes on quicker by several days, and the plucking and pruning more easily done (there being little undergrowth), with clean stems which run for sometimes over three years without pruning. Owing to climatic conditions and insufficient rainfall a very high *jat* light-leaved variety could not be recommended for Natal, but a really good hybrid seed can be obtained for about £5 per maund (80 lbs.). The expenditure is more than justified by subsequent results in every way as the bushes answer quickly to cultivation and not produce an annual crop of seed and blossom which one learns with regret is used sometimes to plant fresh acres. Cases are known where proprietors have cut out old "China" tea and replanted and are satisfied; it has paid them. Not one would contemplate planting from seed taken from bushes in bearing. If an estate does plant from its own tea a portion of the estate widely planted is kept for the purpose and allowed to grow into trees from which the seed is taken, and these trees are grown from imported seed from India.

Much more can be said as to the comparative methods of field work, plucking and pruning, but space forbids, though this is as important in the production of a first-class tea as manufacture only. Many planters aver that tea is *made in the field* and there is as much difference in Natal methods of cultivation as in manufacture, more especially as regards pruning and plucking.

Orchard Culture.

TILLAGE *versus* SOD MULCH IN THE APPLE ORCHARD.

WHICH IS THE BETTER SYSTEM?

THE question as to whether the apple thrives better under tillage or in sod has long been a subject of controversy among apple-growers and orchard experts generally in all parts of the world. What are the comparative effects of tillage and sod on the apple tree? Each system has its advocates, but is there any material difference between the results obtained from orchards under tillage and in sod respectively such as would warrant advocacy of either system? And if there is any difference, which system has the balance of results in its favour?

This is not the first occasion on which we have referred to this interesting question. In our issue of January, 1908 (page 53), we published an article in which we gave the results of experiments conducted by the Ohio Agricultural Experiment Station, having for their object the elucidation of this same problem of apple orchard culture. From these experiments the inference was to be drawn that the apple thrives better under a sod and mulch method of management than under tillage and cover crops. The Bulletin from which we drew our account of the experiments, however, omitted to refer to so many important details of the method of conducting the experiments that, although the conclusions drawn may have been applicable to the Ohio Station orchard, it will be difficult to make proper application of them to many other conditions. The experiments, however, yielded some interesting results, and their publication in the pages of this *Journal* was, we venture to hope, found useful by apple-growers in Natal.

Another important experiment, or rather a series of experiments, to which reference should be made are those conducted by the Woburn Fruit Farm. At the Woburn Experimental Fruit Farm, Ridgmont, England, experiments with trees in sod and under tillage have been carried on for the past thirteen years, and have been reported upon from time to time by the experimenters. The Third Report of the Woburn Farm is a treatise on "The Effect of Grass on the Apple Tree," in which the methods employed, the results obtained, and the causes of the effects of grass on trees are very fully discussed. The conclusions of the Woburn Farm investigations as to effects are as follows:—

"As to the general effect produced by grass on young apple trees, the results of the last few years have brought forward nothing which can in any way modify our previous conclusions as to the intensely

deleterious nature of this effect, and we can only repeat, that no ordinary form of ill-treatment—including even the combination of bad planting, growth of weeds, and total neglect—is so harmful to the trees as growing grass round them; indeed, the ‘neglected’ trees in plot 44, which up to 1900 showed only a slight advantage over the grass-grown trees, are now decidedly superior to them, both in size and vigour, whilst in the similarly ‘neglected’ plots of standards the trees are but less vigorous than the normal ones.”

The authors state that their investigation leads them to believe that water supply, food supply, and air supply are not the principal causes of the deleterious effects of the grass on the trees. Soil temperature is discussed and dismissed as not being a prime factor. The chief hypothesis set forth in this report as to the cause of the evil effect of grass on the apple is that toxin is excreted by the grass roots. The statement in this regard is as follows: “Direct experiments seem to negative the possibility of explaining the action of grass on apple trees in the various ways which we have discussed above, water, food, and air supply, and lead us to a conclusion, which has also gradually been forced upon us by the appearance itself of the trees throughout the years that they have been under observation, namely, that this action of grass is not merely a question of starvation in any form, nor of any simple modification of the ordinary conditions under which a tree can thrive, but that the grass has some actively malignant effect on the tree, some action on it akin to that of direct poisoning.”

Here we have a definite opinion, formulated as a result of thirteen years’ experimenting, that the practice of growing grass around apple trees is attended with harmful effects.

The latest experiment of importance of which results have been published is one which was begun under the auspices of the New York Agricultural Experiment Station in 1903 in the orchard of Mr. W. D. Auchter, near Rottecher, New York. Such interesting results have been obtained that we propose to give some account of the experiment for the benefit of our readers. A preliminary report on the experiment has just been issued by the New York Station in the form of Bulletin No. 314 from the pen of Mr. N. P. Hendrick. Two sets of experiments are in reality being conducted, one on Mr. Auchter’s farm and the other on the farm of Mr. Grant Hitchings, but work in the latter orchard has not been carried far enough to warrant a formal presentation of results. We may add that the investigations are to continue for five years to come.

The Auchter orchard consists of a little over $9\frac{1}{2}$ acres of Baldwin trees set in 1887 at a distance apart of 40 feet each way. There are ten rows in the orchard, each containing 26 trees. Rows 1 to 5, inclusive, are under sod-mulch treatment, and rows 6 to 10 are tilled.

A few trees in each plot are not in the experiment; the number of trees in the sod plot actually in the experiment is 118, in the tilled plot 121. Previous to this experiment the trees had been under tillage with an annual cover crop. Variations in soil are few and slight.

MANAGEMENT OF PLOTS.

The trees in the two plats of the experiment have received as nearly as possible identical care as to spraying, pruning, and all other orchard operations excepting soil treatment. The soil in the two plots has been managed as follows:—

Sod Plot.—October 15, 1903, eight quarts each of orchard grass and blue grass seed were sown per acre, from which a fairly good stand was secured. To make sure, however, of a good stand of grass, a second seeding of sixteen quarts of blue grass, eight quarts of orchard grass, and three quarts of timothy seed was made April 21, 1904. During the first season the grass flora was well divided between the above three grasses, but the second year the orchard grass became dominant, and has increased in quantity, until now the plot is covered with an orchard grass sod. The grass has been mowed on the following dates during the five years of the experiment:—

1904.—June 21 and August 23.

1905.—June 12 and August 14.

1906.—June 18.

1907.—June 27.

1908.—May 27 and July 4.

The grass, if allowed to stand until haying time, would produce two tons per acre and when cut twice the crop would exceed this amount. The character of the grass growth is shown in Plate II. It was in all cases allowed to remain where it fell from the mower as the roots of the trees spread over the entire orchard area and there was therefore need to mulch the whole area.

Tilled Plot.—The following is a memorandum of the treatment of the tilled plot:—

1904.—Plot ploughed June 7-11; ground harrowed June 13, June 20, July 19, July 29. Cover crop of mammoth clover sown July 30 and the seed harrowed in with a weeder.

1905.—Plot ploughed May 30; rolled June 5; harrowed June 13, June 26, July 7, July 22, August 2. Mammoth clover sown August 3 and the seed covered with a weeder, followed by a roller.

1906.—Plot ploughed June 4-6; rolled and harrowed June 7; harrowed June 22, July 20, August 2. A cover crop of oats was sown August 2 and harrowed in the next day.

1907.—Plot ploughed May 27-29; land harrowed May 31, June 28,

July 17, July 27, August 5. A cover crop of mammoth clover was sown August 6 and covered with a weeder.

1908.—Plot ploughed May 23-26; land harrowed May 27, June 4, 12, 23, and July 31. A cover crop of oats was sown July 31 and harrowed in the following day with a weeder.

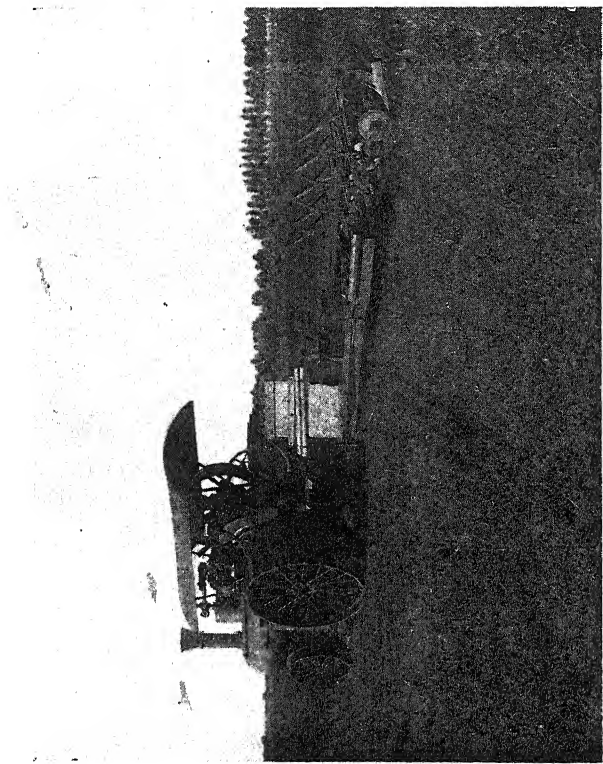
Fertilisers Used.—At the time this experiment was begun there were few data to show what food constituents the orchard lands of the State need. It was commonly thought that the apple lands of western New York need phosphoric acid and potash, and that the land of which that in the Auchter orchard is a type needs the former in particular. For the first three years of the experiment, therefore, 400 pounds of acid phosphate were used in the orchard, and cross rows 8 and 9, running through the tilled and sod plots, were fertilised with muriate of potash at the rate of 400 pounds per acre. It could not be found that trees or cover crops were any the better for the application of potash in these two rows, and it seemed from other data coming in that the phosphoric acid was being wasted as well. The fourth season, 1907, the general application of acid phosphate for the whole orchard was dropped, but the muriate of potash was continued on cross rows 8 and 9; and the phosphate was applied on cross rows 12 and 13 at the rate of 15 pounds per tree; on cross rows 16 and 17 the two fertilisers were combined in the quantities given above. During the season of 1907 no effects could be observed on apples, cover crops, or grass. It is fair to include, therefore, that the additions of these two food constituents were not needed in this orchard, and their use was discontinued in 1908. None of the plots to which fertilisers had been applied in past years showed any effects in 1908.

RESULTS OF THE EXPERIMENT.

The relative merits of the two treatments have been gauged by all important characters of fruit and tree. The following is a summary of the results of the experiment:—

The average yield on the sod plot for the five years was 72.9 barrels per acre; for the tilled plot, 109.2 barrels; difference in favour of tilled plot, 36.3 barrels. Estimates made at blooming and fruiting time showed a far greater number of fruits on the tilled trees. Actual count showed 434 apples per barrel on the tilled land weighing 5.01 ounces each and 309 apples per barrel on the sod land weighing 7.04 ounces each. The fruit from the sod-mulch plot was much more highly coloured than that from the tilled plot. The fruit on the sod-mulch plot matures from one to three weeks earlier than that on the tilled plot.

In common storage, fruit from the tilled plot keeps four weeks longer than that from the sod plot. In cold storage, the keeping quality of the two fruits is the same.



THE JOHN DEERE STEAM PLOUGHING OUTFIT.—III.

General View of the Engine and Ploughs.

(See Article.)

The tilled fruit is decidedly better in quality, being crisper, more juicy and of better flavour.

The advantage of tillage over the sod-mulch in the matter of uniformity of trees and crops is marked. The trees in sod showed abnormalities in foliage, branches, roots, and particularly in fruit-bearing and in fruit characters. The average gain in diameter of trunk for the trees in sod for the five years was 1.1 inch; for the trees under tillage 2.1 inches; gain in favour of tillage, 1 inch. The dark, rich green colour of the foliage of the tilled trees indicated that the tilled trees were in the best of health. On the other hand the yellow colour of the leaves of the sod trees told at once that something was amiss. It needed only a glance in the orchard to see the leaves of the tilled trees were much larger and much more numerous, and that therefore the total leaf areas were much greater. Leaves from sodded trees and the same number (2,400) from tilled trees weighed and gave 8.7 grams as the average weight per leaf for the sodded trees and 11.5 grams for the tilled trees. The leaves of the tilled trees came out three or four days earlier and remained on the trees a week or ten days later than on the sodded trees. The average annual growth of branches for the sodded trees was 1.9 inch; for the tilled trees 4.4 inches. The average number of laterals per branch on the sodded trees was 3.4; on the tilled trees 6.7.

During the dormant season there was a striking difference in the appearance of the new wood in the two plots. The new wood on the tilled trees was plumper and brighter in colour, indicating better health. The amount of dead wood in the sod-mulch trees was much greater than in the tilled trees.

The roots of the trees in the sod-mulch plot came to the very surface of the ground. How much these trees suffered by the destruction of roots in the heat and drought of summer or the cold of winter cannot be said. In the tilled land the roots were found in greatest abundance at a depth of from three to ten inches. The circumference of root systems in the tilled trees is approximately circular, but the circumference of the roots of the trees in sod is very irregular, indicating a reaching out of a part of the roots in response to a demand for more moisture, food, or air to escape some evil effect of the grass roots. A fair way of comparing the quantity of the living roots of the trees in the two plots could not be found. The trees in the outside rows of the sod plot, where the roots could penetrate into the tilled land, without exception showed better health and greater productivity than the trees in the inner rows.

The average cost per acre for the two methods of management, not including harvesting, was 17.92 dollars (£3 14s. 8d.) for the sod;

and 24.47 dollars (£5 1s. 11½d.) for tillage, giving a difference of 6.55 dollars (£1 7s. 3½d.) in favour of the sod. The average net income per acre for the sod plot was 71.52 dollars (£14 18s.); for the tilled plot 110.43 dollars (£23 0s. 1½d.), a difference of 38.91 dollars (£8 2s. 1½d.) in favour of tillage, an increase of 34 per cent. for tillage over the sod-mulch method of management.

Tillage seems to be better than sod for the apple for the following reasons:—

The results of 120 moisture determinations in the Auchter orchard show that the differences in tree growth and crop in the two plots of this experiment are mainly due to differences in moisture, the tilled plot having most moisture. As a consequence of the reduced water supply in the sod plot, there is a reduced food supply; for it is only through the medium of free water that plants can take in food. Analysis show that the differences between the actual amounts of plant food in the two plots are very small.

Analyses show that there is more humus in the tilled plot than in the sod plot, contradicting the oft-made assertion that the tillage method of managing an orchard "burns out the humus."

At a depth of six inches, the tilled soil is 1.1 degree warmer in the morning and 1.7 degree at night, than the sod land; at twelve inches the soil is 2.3 degrees warmer in the morning and 1.8 degree in the evening.

"We are justified, without the presentation of specific data, in saying that a tilled soil is better aerated than sodded land."

Soil investigators are well agreed that beneficial micro-organisms are found in greater numbers in a cultivated soil than in others.

APPLICATION OF RESULTS.

In concluding, the following paragraphs from the *Bulletin* will, we think, be found of practical value by apple-growers in this Colony:

The well-being of nearly all the plants which minister to the needs of man is improved by tillage. It does not appear from this experiment that the apple is an exception. This fruit responds to high cultivation in the nursery row; it seems to continue to do so when transplanted to the orchard. Results as positive as in the experiment can be made very comprehensive. They will, it is believed, apply to all varieties of apples, and to all fruits, for that matter, and to practically all fruit soils and conditions. It should not be expected, however, that sod will be deleterious in the same degree under all conditions. It should be expected, for instance, that in a deep soil, where the apple roots can escape from the grass roots, or in one containing a great amount of soil moisture, the harmful effects of the grass will not be

so marked as otherwise. The experiment does not show that apples cannot be grown in sod. There are many orchards in New York which would prove the contrary. It suggests, however, that apples thrive in sod, not because of the sod, but in spite of it. The fact that there are many thrifty orchards in sod in New York is not proof that these orchards would not do better under tillage.

In considering the two methods of management, of all the factors effecting the growth of trees in this experiment, conservation of moisture should receive first attention from the apple grower. The statement is affirmed not only by the results in the Auchter orchard but in practice the world over. The climate of Europe is moist; soil orchards are the rule there. Near the Atlantic seaboard in America, as in New England, where the rainfall is comparatively high, thrifty orchards are found in sod. In the western fruit regions where irrigation is practised, sod orchards are hardly to be found; water is purchased and must be conserved. In irrigated lands tillage is found to be the best means of moisture conservation. Moisture is by no means the only factor to be considered in the controversy over the sod and tillage methods of management, but it appears to be the chief one.

The statement is often made that trees will become "adapted" to grass. There is nothing in this experiment to indicate that this is the case. The sodded trees began to show ill-effects the first year the orchard was laid down to grass, and each succeeding year has seen greater injury. Trees can hardly become adapted to thirst, starvation, asphyxiation and poison.

To manage the soil of an orchard properly requires nice adjustments and delicate balancing for each particular case. Soils vary much and all are complex; quite diverse chemical, physical and biological changes take place in diverse soils. Every apple-grower, therefore, has a problem of his own. But the individual problem can be best solved by the rational application of the ordinary laws of nutrition and growth—those which apply to cultivated plants in general. The apple is not unique among plants.

The largest eggs are produced by steady layers.

A cross hen—that is, one that will peck at you if you reach toward her while on the nest—generally makes the best sitter.

Onion Culture.

By W. R. BEATTIE,

*Assistant Horticulturist, U.S. Bureau of Plant Industry.**

THE essential requirements of a soil upon which to grow onions profitably are a high state of fertility, good mechanical condition in order that the crop may be easily worked, sufficient drainage, and freedom from weeds. If a soil has the proper mechanical properties—that is, if it contains sufficient sand and humus to be easily worked, is retentive of moisture and fertilisers, and is capable of drainage—all other requirements can be met. At least three types of soil are being extensively planted to onions in this country, the one common essential being proper mechanical condition.

CULTURAL METHODS.

The onion belongs to that class of crops which gives best results under very intensive culture, and the greatest yields are secured where a moderate acreage is planted and the work conducted in a most thorough manner. There is nothing technical or difficult about the growing of onions, but close attention and frequent cultivation are essential. Once the weeds get a start, the cost of production will be greatly increased, or the crop may be lost altogether.

PREPARATION OF NEW LAND.

As a general rule new land is not adapted to onion growing until it has been worked one or two years with other crops. Onions should follow some crop that has been kept under the hoe and free from weed the previous season. Mealies, beans, and potatoes are suitable crops with which to precede onions. Muck and sandy soils may in some cases be brought to a suitable condition for onions the first season, but the fitting will have to be very thoroughly performed. The land should be ploughed in the autumn, then re-ploughed in the spring, after which numerous harrowings and doubtless some hard work will be required to get the soil in suitable shape.

If necessary to manure the land heavily before planting to onions, it will be desirable to plant some farm crop one season, then apply the manure during the autumn in order to give it time to become incorporated with the soil. Owing to the value of good onion land it would not be advisable to devote it to general farm crops for any ex-

* Abridged from Farmers' Bulletin No. 354 of the United States Department of Agriculture.

tended period, although the maize is frequently planted and oats or rye are sometimes used in the North. Cowpeas may be of great service in bringing new land into shape for planting to onions.

CROP ROTATION.

Onions should not be planted on the same piece of land year after year, and some system of crop rotation should be maintained. Care should be taken, however, to use crops in the rotation that will not be exhaustive of the high fertility necessary in the onion land. During the years when the land is not devoted to onions it can be planted to some truck crop that will give a return that will justify the application of large quantities of fertilisers, or, better, to a leguminous crop to be turned under as green manure. Continuous cropping with onions will cause the land to become infested with both disease and insect enemies that will sooner or later injure the crop to such an extent as to render it unprofitable.

PREPARATION OF THE SOIL.

Assuming that the land intended for planting to onions is capable of being brought to a good mechanical condition, fertile, well drained, and reasonably free from weed seeds, the first step in the production of the crop will be to plough moderately deep, then harrow, disc, roll, and drag until the soil is smooth and mellow to a depth of 4 or 5 inches. The method of preparing the soil will depend somewhat upon its character, the manner of planting to be followed, and the requirements for irrigation. There are few truck or other crops that require so careful fitting of the soil as do onions, and it is essential that the fertilisers be well mixed with the soil.

On soils that are naturally well drained and where surface water can not accumulate, the ploughing may be done in large blocks, but where the opposite conditions are found or irrigation is practised it may be necessary to plough the land in narrow beds. In the case of insufficient drainage it will be desirable to throw the soil together into beds, leaving a double furrow between each bed to carry off surplus water. Where the flooding system of irrigation is practised the beds must be levelled and a system of ditches and ridges provided for distributing and controlling the water. Where it is merely desired to secure surface drainage the beds may be from 75 to 150 feet in width, but for irrigation purposes the beds are generally but 12 or 15 feet in width. If spring ploughing is practised the soil should be harrowed closely behind the plough in order to prevent drying out.

For cutting and pulverising the soil there is perhaps no tool as serviceable as the disc harrow. There is a type of disc having four gangs, in two sets, one combination in front of the other, and so ar-

ranged that the soil is first turned to the centre and then turned outward again by means of the rear-combination. This tool turns the soil twice and leaves it in a level condition.

For imparting the final smoothing touch to the soil before planting there is a device consisting of a large number of small discs set in a wooden frame which does about the same work as a steel rake, but in a rapid manner. A drag or float made from several pieces of scantling nailed together may be used for this purpose, or if the soil is very loose a roller should be run over it. The final levelling should be performed with a tool that will fill and obliterate all tracks or depressions in the soil, leaving a smooth, even seed bed for either seed sowing or transplanting.

FERTILISERS.

As the onion is an intensive crop and yields great quantities of marketable bulbs for the area planted, the grower is justified in manuring heavily. It would be difficult indeed to make the soil too rich for onions provided the manures are thoroughly incorporated with the soil. A heavy application of fresh, raw manure just before planting would have an injurious effect, but where the manure is well rotted and uniformly applied there is nothing to be feared.

Animal Manures.

There is perhaps no fertiliser so well adapted to the production of onions as plenty of clean, well-composted stable manure, and the quantity and frequency of application will depend upon the nature of the land under cultivation. The Bermuda onion-growers of South-Western Texas apply as high as 20 tons of sheep and goat manure to an acre every three years. In addition to the manure there is used 1,000 to 2,000 pounds of cotton-seed meal or commercial fertiliser, and sometimes a top-dressing of nitrate of soda. This sheep and goat manure is from animals that are fed largely upon cotton-seed meal, is saved in the corrals in a climate where there is very little rain, and it contains the essential fertilising ingredients in very high percentages. The manure is first piled where a little water can be thrown over it and is composted for several months before spreading on the land. The best results from this manure are not realised until the second or even the third year after its application.

All stable manure used on onion land should be well composted before use and then spread upon the land several months before planting to onions.

Large quantities of fresh manure applied to onion land just before planting will have a tendency to produce an over-growth of tops at the expense of the bulbs. This is especially true on irrigated lands and soils that are naturally moist.

Commercial Fertilisers.

Where there is an abundance of humus matter in the soil the onion crop will be greatly benefited by moderate applications of high-grade commercial fertilisers. A fertiliser that is suited to the growing of onions should contain 4 to 5 per cent. of nitrogen, 5 to 7 per cent. of phosphoric acid, and 8 to 10 per cent. of potash.

If it is found desirable to secure the ingredients and mix the fertiliser at home, the following materials and proportions are suggested:

	Pounds.
Nitrate of Soda, 14 to 16 per cent. Nitrogen	300
Dried blood	500
Acid Phosphates	800
Muriate of Potash, 50 per cent.	400

The ingredients of these fertilisers should be mixed until shortly before they are to be used, as there is danger of loss from chemical action. In mixing, the proper quantity of all ingredients should be weighed and dumped together in a heap on a clean, tight floor. The work of mixing can be done by shovelling over three or four times, but should continue until all lumps are broken and the mass has assumed a uniform colour and appearance.

Commercial fertilisers should not be applied until shortly before sowing the seed and should be uniformly distributed and thoroughly worked into the soil. There are one-horse fertiliser distributors that scatter the fertiliser broadcast, but where an amount not exceeding 1,000 pounds of fertiliser to the acre is being used the work of distribution may be performed by means of a common grain drill having a fertiliser attachment. On a small scale the work is generally performed by hand.

Many growers follow the practice of applying only a part of the fertiliser at planting time, reserving the balance to be put on as a top-dressing at some time during the period of cultivation. This plan is especially desirable where onions are grown during the winter, as the application of the highly nitrogenous fertilisers in the autumn is liable to promote a soft growth that will be injured by cold. If the fertiliser is not put on until the cold weather is over, the crop may be forced without danger of injury. For this purpose only those fertilisers of a very available form will answer. Nitrate of soda is frequently used as a top-dressing during the height of the growing period.

PROPAGATION.

Propagation from seed is conducted by three more or less distinct methods: First, by sowing the seed in the rows where the crop is to grow and mature; second, by sowing the seed in specially prepared beds and

transplanting the seedlings to the open ground; third, by first growing sets from seed and then, after keeping them through the winter, planting them in the field to produce the crops of mature bulbs. Of these three methods the one first mentioned of seeding in the rows where the crop is to mature is the only one that is practical on a very large scale. Planting sets and transplanting have their advantages, but could not be applied on a large scale owing to the amount of labour required.

Planting the Seed.

In the northern onion-growing districts the seed is sown as early in the spring as the soil can be brought to the proper condition. While it is desirable to plant quite early it never pays to sow the seed before the land is in the best possible condition. When the soil has been brought to a smooth, even surface and is fine and mellow, the seed is sown by means of one of the common seed drills, of which there are several makes upon the market. The hand drills, which sow one row at a time, are extensively employed, but many of the larger growers employ a gang of drills hitched together and plant from five to seven rows at once. A more even distribution of the seed will be secured by the use of the single-row hand drill owing to the closer attention that can be given the one machine. The first row may be planted with a line, and after this the marker on the drill indicates the next row. The drills are so arranged that the shoe and covering blades can be regulated to cover the seed at the proper depth, which will vary with different soils. In heavy or moist soils the depth to cover the seed should not be more than one-half to three-fourths inch, while on loose and sandy soil the seed may be covered an inch or more.

Planting Distances and Seed Required to Plant an Acre.

Where hand cultivation is practised throughout, the usual distance between rows is 12 or 14 inches. Where horse culture is employed the distance between rows varies between 24 and 36 inches. The quantity of seed required to plant an acre will depend both upon the distance between rows and the purpose for which the onions are being grown. For the growing of standard market onions in rows 14 inches apart, about 4½ pounds of first-class seed will be required. With the rows 3 feet apart, but 1¼ or 1½ pounds will be necessary. Where it is desired to produce small onions for pickling purposes, the amount of seed may be as great as 25 pounds to an acre. Good seed is essential, and if there is any doubt regarding the vitality of the seed it should be tested before planting by counting and planting four or five hundred seeds in a window box and then determining the germination by counting the seedlings after ten days' or two weeks' time. Old and inferior seeds are not only low in percentage of germination, but lack the vitality

necessary to produce strong, healthy plants. There are dealers who make a speciality of securing and furnishing extra-quality onion seed, and, while their prices are often somewhat above the general market, the seed furnished by them is always preferable to ordinary seed.

Thinning.

Experimental growers are frequently able by using extreme care in regulating the drills to distribute onion seed in rows where the crop is to mature so that little thinning will be necessary. Thinning is generally left until the time of the first hand weeding, when all thick bunches along the rows are thinned to a uniform stand of eight or ten plants to the foot. It is always well, however, to allow for considerable loss of plants, and unless the plants are so thick as to actually crowd, thinning will not be necessary.

Transplanting Method of Growing Onions.

The transplanting process, often spoken of as the "new union culture," is merely a modification of the regular seeding method. The objects gained by transplanting are an earlier crop, a uniform stand, and bulbs of more regular size. Practically the entire Bermuda crop of the Southern States is handled in this manner. Where a small area is to be grown, the transplanting process is the ideal method, but for large acreages and where labour is difficult to obtain this would not be practical. After transplanting, the seedlings will require rain or watering in order that they may start, and for this reason the transplanting process is practically limited to areas where some form of irrigation is available.

In growing onions by the transplanting method the seed is sown in greenhouses, hotbeds, cold frames, or specially prepared beds at the rate of $3\frac{1}{2}$ or 4 pounds for each acre to be planted. When the seedlings are grown under cover, they are given the necessary attention regarding watering and ventilation and kept growing quite rapidly until near the time for setting them in the open ground. As planting time approaches, the seedlings are "hardened" or prepared for transplanting by increased ventilation and exposure and by withholding water. When ready to transplant, the seedlings should be somewhat smaller than a lead pencil and rather stocky. The plants are lifted from the seed bed and the roots and tops both trimmed somewhat. They are then packed neatly in shallow boxes for removal to the field where they are to be planted.

Various methods are employed for handling the plants in setting. As a rule, a line is used and the land marked to indicate the location of rows. Several methods are employed for marking the distance between plants in the rows; one method is by means of a line with small

lead or brass indicators at regular intervals; another method is by means of a board having notches or holes in which a pointed dibble is thrust to form a hole in which to set the plant. A marking device much used by the Bermuda onion-growers in Texas consists of a sectional roller with the sections the same distance apart as the distance between the rows and each section provided with conical pins to form the holes in which the plants are set. The objection to the sectional roller marker is that it can not easily be drawn in a straight line, and straight rows are essential to good cultivation.

After marking the land, the plants are dropped ahead of the planters, or they may be kept in the trays and simply removed as planted. The transplanting process consists mainly in pushing the root end of the seedling into the soil with one finger and then firming the soil about the plant. This work is very laborious and can only be performed economically by very cheap labour. A small plough, such as is generally included with the attachments of the wheel hoe, is often employed for opening a furrow in which to set the small onion plants. As the plants are set the soil is either drawn about them by hand, or the plough may again be used for this purpose.

Propagation by Sets.

The use of sets is still another modification of the regular seeding method, in which the seed is planted one year to form the sets from which to grow a crop of mature onions the following year. Like the transplanting process, the use of sets is limited in its application. Onions grown from sets will ripen earlier than those from seed sown in the field, but the use of sets for commercial onion-growing is not so practical as transplanting seedlings. In planting onion sets a furrow about 2 inches deep is opened, the sets being dropped about 3 inches apart and firmly covered. For best results the sets should be placed in an upright position. The quantity of sets required to plant an acre will depend upon their individual size and planting distances, but it is generally between eight and nine bushels.

METHODS OF TILLAGE.

The cultural requirements of the onion are frequent shallow stirring of the soil and freedom from weeds. The feeding roots of the onion run close to the surface of the soil and should not be disturbed by deep cultivation. Sometimes a heavy rain immediately after seeding will so pack the surface that the seedling can not break through. Under such circumstances it will be necessary to slightly break the surface by means of a steel rake or a rake-like attachment on a cultivator. As soon as the plants are up and the row can be followed the cultivator

should be started to loosen the soil, which is always more or less compacted during seeding.

Hand Cultivation.

Where the rows are 14 inches or less apart, the work of caring for the crop must all be done by hand. For this purpose the wheel-hoe tools of various types are essential. These implements are provided with several kinds of hoes, cutters, and sweeps designed to work the soil away from the plants, to shave the surface and destroy weeds and to stir the soil and work it back around the plants. Onions grown on muck and alluvial soils will require from eight to fourteen workings with the wheel-hoe implements; on sandy soils it will not be necessary to cultivate so frequently.

Several types of wheel-hoe are in use, but those having a single wheel and passing between the rows are most desirable.

Horse Cultivation.

In sections where onions are grown on a soil that is not well adapted to hand culture the rows are placed 30 to 36 inches apart and the cultivation is done by means of horse-drawn tools. This is particularly true where onions are grown on the "black waxy" soils of Texas and other soils of the prairie type. As with hand culture, frequent shallow stirring of the soil is essential, the work generally being performed with one of the harrow-tooth cultivators. An implement known as a weeder can be used for breaking the surface before the seedlings appear; also for general cultivation by removing a tooth at the point where the rows are located.

Hand Weeding.

It is well-nigh impossible to produce a crop of onions without some hand weeding. During favourable seasons the strictly hand work may be reduced to but one or two weedings, but a greater number will be necessary during rainy seasons.

(To be continued.)

If the cover of a fruit jar stick do not attempt to wrench it off; simply invert the jar and place the top in hot water for a minute. Then try and you will find that it turns easily.

Handling Grain for Export.

BULK *versus* SACKS.

THE way in which grain is handled, whether in bulk or in sacks, naturally affects its transportation by rail in various ways. It is apt to affect the rate of the grain. It affects the quantity of it that can be got into a truck, and it also otherwise affects the cost of rail for transportation. It has furthermore a relation that is not generally recognised to the subject of truck shortage, and to the kind of trucks used in handling grain. By far the greater portion of the grain grown in the United States has for many years been transported to market in bulk. In other words, it has been run from the threshing machine or sheller into the farmer's wagon, thence either to the nearest country elevator or else to the farmer's granary to be later on taken to the elevator. In the elevator, being loose, it is mixed with grain received from other farmers, run into railway trucks as soon as there is sufficient to fill a truck, hauled in truckloads to the terminal elevator, and finally exported and delivered to the miller in bulk. While most of the grain is thus handled in bulk by means of the elevator system, there is nevertheless an appreciable portion handled in sacks, this being the system largely in vogue in the extreme north of the United States.

The story of the grain elevator system in the United States, its origin and its development to its present enormous proportions is told by Mr. Samuel O. Dunn in the *Railway Gazette* of the 18th and 25th June, in an article dealing with the two methods of handling grain referred to above. In the words of the author, "the grain elevator system, which is now one of the most characteristic parts of the machinery of the United States, has grown up largely in response to the same demand, and has been given its present form largely by the same conditions that have stimulated and shaped the growth of the American railway system, with which it has always been very closely interwoven." Mr. Dunn's article contains so much of interest at the present time to the South African mealie grower, produce merchant, and grain exporter, that we propose to make a resume of the article for the benefit of readers of the *Journal*.

To begin at the beginning, the Chicago Board of Trade was organised in April, 1848, with the object of establishing a point where buyers and sellers of grain could meet to transact business. At that time wheat was hauled to Chicago in wagons from a radius of 100 miles around, and was sold in the Chicago market at 40 cents (1s. 8d.)

a bushel. Not only were there no railways to transport it, but roads and even bridges were wanting, and the farmer's profit from his crop, of course, was negligible. The issuance of a charter to the Illinois and Wisconsin Railway Company in Illinois in 1851 marked the beginning of the development of the so-called "granger railways." The Illinois and Wisconsin is now a part of the Chicago and North-Western system. As the various railways pushed out from Chicago the grain dealers in that city sent buyers to the country stations, who were either merely agents for the Chicago merchants or did business on capital furnished by them. In either case the grain bought at the local station was usually purchased either directly or indirectly on the account of the Chicago merchant and shipped to him. No one can say just when or where the first grain warehouse bearing any resemblance to the modern elevator was built. In the early days, however, the farmers of the Middle West hauled the grain to the local railway stations in sacks, from which the grain was poured into a hopper and elevated by means of an endless chain of buckets into bins, from which again it was discharged by gravity into the railway trucks. Horse power was used for elevating the grain into the bins.

Elevators soon came to be put up at numerous country stations along every line of railway; and they were well patronised from the first, because they met with the needs of all directly concerned—the farmer, the grain dealer, and the railway. By enabling the farmer to deliver grain in bulk they saved him the expense of buying fresh sacks every year. If his grain came from the field wet, the elevator manager had facilities for preventing it from spoiling that no individual farmer could provide. Grain grown in the Middle West, it is said, must sweat somewhere: if it does not sweat in the sack it is apt to sweat in the bin, and if it does not sweat in the bin it is apt to sweat in the flour. Again, the elevator was not only a facility for transferring the grain from the farmer's wagon to the railway truck but it was also a storehouse; the fact that the dealer had a place to keep the grain if the market was unfavourable after he bought it, enabled him to take it as fast as it came in, and then hold it for a good price, a thing that the farmer with his lack of financial resources could not do.

The presence of elevators on its lines was, furthermore, advantageous to the railway. Grain could be accumulated in the elevator until there were several truck loads and then poured rapidly into the trucks. This made delays to rolling stock less than when the grain was shovelled from the farmer's wagons into trucks or was transferred direct from the farmer's wagon to the trucks in sacks. At one time there used to be a number of little flat warehouses along the railways in the Middle West, some of them having a capacity of not more than

400 muids. It took two, three, or even four days to scoop enough grain from one of these to load a truck. On the other hand, the ordinary country elevator had a capacity of several thousand bushels; a modern country elevator usually has a capacity of no less than 25,000 bushels (which is equivalent to over 8,300 muids), and from ten to fifteen trucks can be loaded daily. As Mr. Dunn points out, where sack grain is accumulated in flat warehouses before being loaded on cars, the delay which loading it causes to railway equipment is less than the delay that would be caused by shovelling it from a wagon into a truck, but it is substantially greater than the time taken to load trucks from an elevator. In seasons of heavy railway traffic the elevators afford a place where large quantities of grain can be stored awaiting trucks; and therefore it is contended, the elevator system tends to reduce the congestion of traffic at such times.

Besides these country elevators, there are the large terminal elevators situated at the large markets and points of export. The advantages to the farmer, the shipper, and the railway of these terminal elevators were early recognised. The grain as it comes from the farmer in the Middle West often needs to be dried, cleaned, etc., to render it fit for export or for milling. For example, occasionally during a wet season, there is a soft maize crop in Illinois. Mealies in this condition cannot be transported far without spoiling. It is necessary to get it as soon as practicable when it can be properly treated, and this usually can only be done in a large terminal elevator, for the country elevators are seldom equipped with machinery for any purpose but the transferring of grain—elevation properly so-called.

The facilities offered by the establishment of both the country and terminal elevators were realised by all concerned in the handling of grain. The advantages were realised by the railways quite as much as by the producers, merchants, and consumers, and consequently the railways in the Middle West did all they could to stimulate the development of the elevator system. In some cases they built and operated both country and terminal elevators themselves. In other cases they furnished the capital for the organisation of companies which built and operated the elevators. In other cases they built elevators and leased them at low rentals to grain dealers. In still other cases they leased land to private individuals for the construction of elevators at purely nominal rentals—at \$1, \$2, or \$5 per annum. The operations in connection with these elevators appears to be somewhat as follows: The grain is usually bought in the country by the manager of a country elevator. It is weighed, taken into the elevator, and paid for, and the transaction is completed so far as the farmer is concerned. Occasionally the farmer puts his grain into the elevator subject to order for

future shipment, or sells to what is known as a "truck-buyer," in which case the grain is delivered directly from the wagon to the truck. The owners of country elevators sometimes have no connection with any terminal elevator, in which case the grain is sold f.o.b. at the country station and consigned to the owner in care of some commission house at a central market. In most cases, however, the country elevator is one of a string of elevators that is operated by some concern which also operates large terminal elevators and buys and sells grain. Ordinarily such concerns keep their business as operators of elevators and their business as dealers in grain nominally separate.

An idea of how the elevator system has grown will be gained when it is stated that at 25 large terminal markets or exporting points in the United States there are 428 elevators with an aggregate capacity of 260,541,000 bushels (86,487,000 muids). Chicago contains the most, having 87 elevators. The maize crop of the United States in 1908 was 2,668,651,000 bushels; the oat crop was 807,156,000 bushels, and the wheat crop 664,602,000 bushels. The terminal elevators at the twenty-five centres referred to have therefore a storage capacity equal to considerably more than one-third of the total wheat crop, or to almost one-third of the total oat crop, or to one-tenth of the total maize crop. This, of course, besides takes no account of the thousands of country elevators, one of which is found at almost every country station of importance, and of which there are sometimes as many as eight or even twelve at an important station in the grain belt.

The terminal elevators at most points are divided into two classes—public and private. The private elevators handle only grain bought and sold by their proprietors, and are equipped with machinery for grading, blending, etc. Public elevators transfer and store grain for everybody who tenders it, and the owners are not allowed to handle grain belonging to themselves. They have no machinery for treating the commodity, and are required always to keep the same grade in the same bins. The storage rate at Chicago is three-quarters of cent (three-eighths of a penny) per bushel per day for the first ten days, and one-fortieth of a cent (one eightieth of a penny) for each additional day.

While the system of handling grain in bulk through elevators has become almost the only method used in the Middle West, the system of handling it in sacks has grown up and is, as we stated at the beginning of this article, still the prevalent method in the extreme North-West. There the farmer sacks his grain in the field when it is threshed, and it is hauled in sacks to a flat warehouse at the country station instead of to a elevator. It is also hauled in sacks by rail, and when it reaches the large markets on the Pacific seaboard, it is put into large, flat

warehouses in sacks. Some of the warehouses have a capacity of as much as 2,000,000 bushels.

Whether the system of handling grain in bulk is to be preferred to that of handling in sacks depends for its answer upon the conditions prevailing in the country concerned: the system that suits one country might not suit another, and in the United States we have an instance of the two systems working side by side, a result of the diversity of conditions to be found in such a large country. While some of the railway officers in the United States who have investigated the subject regard the argument in favour of bulk handling as conclusive, others think that there is much to be said in favour of handling in sacks. The main reason, says Mr. Dunn, why the system of handling in sacks has held its own is that a very large proportion of the grain grown in the North-West is exported to Europe and Asia. The amount exported fluctuates greatly from year to year according to the size of the yield, the Oriental market for grain and the proportion of the total crop absorbed by the flour mills; and the proportion taken by the flour mills depends upon the condition of the export flour trade, particularly to the Orient. The wheat exporters on the coast do not favour bulk shipments by seed or bulk handling of wheat from the country railway stations to terminals. Grain making the long voyage from the North Pacific Coast to Europe must cross the equator twice, and it is claimed that when shipped in bulk it will heat and reach Liverpool in bad condition. Another objection to bulk shipments is to be found in the fact that so many varieties of wheat are grown in the North-West—eight distinct varieties being produced in Eastern Washington alone—that it is impossible to make a full cargo of any one kind. Furthermore, the exporters claim that the necessary investment in elevators both at country stations and terminal points is so much greater than in the flat warehouses that they could not successfully compete with the flat warehouses unless the railways charged a higher freight rate or sacked grain, in which event the net return to the farmer would be decreased. Other objections brought forward to the adoption of bulk shipping in preference to handling in sacks are that it would endanger the boats in which the grain was carried—it is said that even under the present system of stowing grain in sacks and securing it by boards to prevent it from shifting from one side of the boat in a heavy sea in a manner impossible with bulk grain, no seed impasses without some of the grain fleet being damaged or lost through the shifting of the cargo in the heavy seas met in the vicinity of Cape Horn; that the handling of grain in sacks is to a great extent preferable on the railway by reason of the fact that it must be handled in box trucks, while any kind of freight car can be used for sack shipments.



PERUVIAN MEALIES.

In view of the renewed interest in Maize Cultivation at the present time we make no apology for reprinting the above illustration, which appeared in our February, 1904, issue. The photo. was supplied by Mr. Deane, the present Minister of Agriculture, and depicts a good stand of Peruvian mealies growing on Mr. J. Varty's farm at Reit Vlei. Mr. J. Varty, who is 6 feet high, is seen standing in front of the mealies. The mealies were planted on October 19th, 1903, and the photo. was taken by Mr. Deane on February 5th, 1904.

For these and other reasons grain is handled in sacks in the North-West of the United States. The question has, as we have said, to be decided by local conditions; it is difficult to find two countries whose grain trade is carried on under exactly similar conditions, and the methods of procedure must necessarily differ in each case. The foregoing information will, we think, prove interesting and instructive to South African producers and shippers of maize as showing the methods which are in vogue in the greatest of all grain producing countries—the United States of America.

BETTER THAN A POULTRY YARD.—The objections to a yard for fowls are that all vegetation in it will soon be killed and then the birds are confined on bare land, and land that is rapidly made filthy. Also the manure is badly wasted. A writer in the *American Thresherman* remarks that a hurdle can be made quickly, that is durable, light, will not blow down, is inexpensive and enables the owner to give the birds clean range and use the enriched land for crops. It is in the form of a capital I, laid on one side. Scantling or poles twelve feet long with a hole bored in each end are procured and end pieces four, five or six feet long, according to the height of fence needed. A hole is bored through the middle of each end piece. Only one long strip is required for a hurdle. Fasten to it end pieces by driving through the holes a heavy wire spike and clinching it. Now a galvanized wire is strained from the top of one end piece to the bottom of the other both ways and poultry net stapled tightly over all. The brace wires should be fastened well to the middle piece where they cross. The net should be six inches wider than seems necessary, the extra net to be left loose at the bottom to conform to inequalities of the surface. Now drive a staple in the top of each post at the side. Each must have a brace also and to one end of the brace a hook is stapled firmly. This hook is dropped into the post staple, permitting the hurdle to lean slightly against it, and from the yard that is being formed by the hurdles. When the fowls are roosting, a boy can easily unhook one hurdle at a time and carry it to new ground and set it; so with the entire line. A light roost on runners may accompany the hurdles a few feet at a time, by crowding it forward with a crowbar. This should be twelve feet long to match the hurdles, but not more than five feet high and wide.

The Milk Supply.

LECTURE BY PROF. LOUDON M. DOUGLAS.

AN interesting lecture on the subject of the milk supply was delivered at Catlin's Arcadia, Scarborough, on the night of July 2nd, by Mr. Loudon M. Douglas, of Edinburgh, who is well known as a lecturer and an author in connection with this subject.

The lecture was illustrated by means of a large number of lantern slides, illustrating various aspects of the question, and an interesting demonstration was also given of the contents of the milk, each constituent being shown in a separate bottle, which is a graphic way of demonstrating how the lactic fluid is built up.

The lecturer pointed out how important the milk supply was as a factor in the health of the nation, and how the intimate study of the question had only begun within the last quarter of a century. During that period, however, a large literature had grown up in connection with the subject in all civilised countries, and many difficult problems had presented themselves in connection with the original researches which had been made. Although at the present day we know a good deal about milk, there were yet many things which were unexplained. The article which was spoken of in connection with the milk supply was cows' milk, and it was estimated that 1,723 million gallons were produced in the United Kingdom, of which 620 million gallons were consumed as milk, the remainder being utilised for butter and cheese. The consumption worked out to 13 gallons per head of the population, which, however, was behind the United States of America, where 25½ gallons per head of the population were consumed. In order to get this quantity a stock of a little over 4½ million cows, valued at £40,000,000 sterling, was required, which showed how gigantic an industry dairying was in the United Kingdom.

The lecturer proceeded to describe the physical properties of milk, and mentioned that one single drop contained many millions of the fine fatty globules which constituted cream, and those globules were so finely divided that it was stated that if a person attempted to count them it would take him ten years, provided he counted 100 per minute and worked for six days in every week.

The various breeds of cows were touched upon, and it was shown that the Dutch breed had so far excelled all others in producing a cow which gave for one year a total of 2,743 gallons, which is rather more than six times the quantity given by the average cow in the United Kingdom. The sensitiveness of milk to odours and germs of disease

was then touched upon, and the necessity for cleanliness and hygienic conditions was urged. Cleanly conditions were absolutely necessary to a wholesome milk supply. Tuberculosis was the principal disease which had to be dreaded in milk, and it was shown how this micro-organism could be injected into the system in a very simple way, through the milk supply, and it was one of the principal objects of the Milk and Dairies Bill, which had been recently issued, to try and prevent the spread of disease from tuberculosis. All diseases which could be milk-borne could, however, be controlled by means of heat, and this was called pasteurisation. It meant the total destruction of pathogenic or disease-producing germs in the milk. The average temperature used in pasteurisation of heating the milk was 170 deg. F., at which figure tuberculous germs were totally destroyed and all of the ordinary disease germs also.

The apparatus in connection with the application of pasteurisation was extremely ingenious and was fully illustrated and described. It had now become universal throughout the dairying industry, and it was therefore a splendid thing for the milk consumers that they could rely upon the milk which they took, being thus rendered wholesome and free from any hidden danger. It had been said that the pasteurising process was disadvantageous, as it produced carelessness on the farm and also that it affected the digestive properties in the milk, but those objections were only of a minor character. The only real objection was that the pasteurising process increased the cost. There were few people, however, who had taken the trouble to study the question, but would acknowledge that the increased expenditure was amply justified.

FALSE FLOORS IN HORSE STALLS.—The editor of *Wallace's Farmer* suggests, in reply to an inquiry, that the objection to cement floors in horse stables may be overcome very easily by putting false wooden floors in the stalls where the horses stand. He tells of a stable he has with a concrete floor throughout, but in the stalls are movable slat floors, which are hooked to the sill in front to hold them in place, but which may be raised up from behind when desired, or may be unhooked and removed altogether, in order to make a thorough job of cleaning. The false floors are made of elm slats, two inches wide, and set one inch apart.

Moles and their Destruction.

SOME USEFUL HINTS.

We have received a request from a reader to be supplied with information regarding the destruction of moles, from the depredations of which animals he is suffering considerable loss, particularly in his tobacco fields. We have by us a leaflet issued some time ago by the Biological Survey Branch of the United States Department of Agriculture giving directions for destroying the little animals known in America as "pocket gophers." These pocket gophers differ somewhat from our local moles, but their habits are much the same and they appear to do just as much damage, and in just the same manner, as moles. We accordingly think that the recommendations of the Biological Survey Branch, as given in the leaflet referred to, for destroying these pocket gophers, will be equally applicable to the case of our moles; and as our correspondent's enquiry is of general interest we publish herewith such of the information contained in the leaflet as is likely to prove of general interest to Natal farmers.

The leaflet points out that pocket gophers may be destroyed by poison, by traps, and by the use of carbon bisulphide. Poisoning with strychnine is the most effective means known for killing pocket gophers, and, as it involves the least expenditure of money and labour, the Biological Survey recommends it for general use. As a rodent poison to be used by farmers, strychnine has several advantages. Its action is sure, its deadly character is known to most persons, and its bitter taste is an additional safeguard against mistaking it for a harmless drug. Strychnia sulphate is the most convenient form of the poison, since it is freely soluble in hot water and in the natural juices of vegetables used as bait. To disguise its bitterness so that rodents may not be deterred from eating the baits, sugar is often employed, or the strychnine may be mixed with its own bulk of commercial saccharine. A sugar syrup poisoned with strychnine may be used with excellent results. It is prepared as follows:—

Dissolve an ounce of strychnia sulphate in a pint of boiling water. Add a pint of thick sugar syrup, and stir thoroughly. The syrup is usually scented by adding a few drops of oil of anise, but this is not essential. If preserved in a closed vessel, the syrup will keep indefinitely.

The above quantity is sufficient to poison a half bushel of shelled maize or other grain (maize recommended). The grain is steeped in hot

water and allowed to soak over night. It is then drained and soaked for several hours in the poisoned syrup. Before using, mealie meal may be added to take up the excess of moisture.

Dry crystals of strychnine also may be used. They are introduced, by means of a knife, into small pieces of potato, carrot, or sweet potato, or into entire raisins or dried prunes. A single large crystal (or several small ones) is enough for each bait. Raisins are especially recommended because they are easily handled and contain enough sugar to disguise the bitterness of the poison.

The prepared baits are introduced into the underground runways of the gophers and are conveniently handled with a spoon. A stout dibble is used to make holes into the runways. This consists of a spade handle shod with a metal point and having a strong bar for the foot of the operator about 15 inches from the point. Having located the runway by use of the dibble, it is moved from side to side to make the soil firm about the hole, and then withdrawn. A piece of poisoned potato or raisin or a teaspoonful of the poisoned maize is dropped into the hole, which is left open. Some farmers prefer to cover the holes, but the experience of the writer of the leaflet is against the practice.

By this method but little labour is necessary, and the operator soon acquires skill in finding the runways. The bait should be placed in the main runways and not in the short laterals near the mounds. If placed in the laterals, the animals are likely to cover it with soil or throw it out without finding it. A skilful operator can go over 20 to 40 acres of badly infested land in a day, and, if the work is carefully done at a time when the pocket gophers are active, all the animals should be destroyed by the first application of poison.

TRAPPING.

Trapping is a successful method when followed intelligently and persistently. It is especially adapted to small fields, orchards, and gardens, where only a few gophers are present; but in the case of large areas that are badly infested, the method involves too much labour.

For trapping gophers an ordinary No. 0 steel trap may be employed, but there are a number of special gopher traps on the market that are better adapted for general use.

In using the ordinary steel trap, the first step is to make an opening into the main gopher tunnel. The trap should then be sunken so that the jaws are level with the bottom of the runway and lightly covered with green clover or lucerne or grass, or even loose soil, care being taken that these do not clog under the pan, or trigger. No bait is required. The hole should be just large enough to receive the trap and should be covered so as almost to exclude the light.

Besides the ordinary steel trap, various special gopher traps have found favour with farmers. Several traps are on the market whose main advantage lies in the ease and simplicity of operation and in the fact that they kill the animals instantly. All of them have been found to be excellent, but the simple ones have advantages over those with closed sides. The special traps should be set in the laterals leading into the main tunnel of the gopher, or at the entrance of open burrows where fresh earth is being thrown out. The trapper should choose the freshest of a series of mounds and dig along the lateral until it is found clear of soil.

CARBON BISULPHIDE.

Carbon bisulphide has been employed for killing pocket gophers, and under favourable conditions its use is recommended. If the burrows are extensive or the soil dry, the gases are dissipated so rapidly that a large quantity of the liquid is required to kill the animals and the method becomes too expensive. If, however, the burrows are simple and the soil moist, bisulphide may be used successfully. For pocket gophers an ounce of the liquid for each burrow is sufficient. The carbon bisulphide is poured over a bunch of cotton, rags, or other waste material and this quickly pushed into the burrow, which should be closed at once.

CO-OPERATION.

The leaflet concludes by remarking that any farmer may readily rid his premises of gophers by the use of poison or traps. "Unless, however, the entire community unites in active and intelligent co-operation in the destruction of the animals, the cleared area will be sooner or later invaded from neighbouring premises, and the work of destruction must be repeated. Co-operation only will effect a radical cure. When co-operative efforts for the extermination of gophers over a considerable area are attempted, careful attention must be given to waste lands along fences, streams, public highways, and railroads. Such places are favourite haunts of the animals, because in them are found loose, sandy soil, moisture, and succulent roots for food. It is from such resorts that adjoining farms are often restocked with pocket gophers."

Of all the animals kept on the farm the pig can consume feed and get the greatest gains from it, which will sell at a high price, with the least shrinkage when cut upon the block or trimmed for the barrel.

Potatoes for the Transvaal.

NEW REGULATIONS.

THE attention of all interested in the export of potatoes into the Transvaal is directed to the following circular letter which has been issued by the Transvaal Department of Agriculture, covering regulations which have been recently framed on the subject. We are indebted to Mr. Alfred Webb, produce agent to the Cape Government, P.O. Box 2342, Johannesburg, for copies of the letter and regulations. The circular letter is headed

RE-SORTING OF POTATOES AT JOHANNESBURG

and reads as follows:—

"SIR,—I have the honour to inform you that the important question of the re-sorting of consignments of table and seed potatoes which are imported into the Transvaal from Natal, Cape Colony, and Orange River Colony, as well as from overseas, has recently received our serious consideration, and the following scheme has been formulated, principally for the purpose of enabling our farmers to procure large quantities of seed potatoes free from disease.

"1. All consignments of potatoes which are imported from overseas or from neighbouring Colonies will be inspected upon arrival in the Transvaal at Volksrust, Vereeniging and Christiana, and if found to be free from insect pests and plant diseases will be immediately forwarded to their destination, but if found to be infested with any disease the consignors or consignees will have the option of having such consignments despatched to Johannesburg at their expense for the purpose of being sorted there under the supervision of our Plant Inspectors. A charge of 6d. per case or bag will be made in order to cover the actual cost of re-sorting the potatoes. In the case of seed potatoes in full trucks intended for Johannesburg and Pretoria, such will not be detained at the Border stations, but will be examined upon arrival at destination. In the case of consignments of seed potatoes from overseas, if the consignors or consignees are not desirous of paying such charges, the consignments will have to be destroyed at the Border stations within four days after arrival, as the other Colonies, and also the Government of the Province of Mozambique, have recently enacted legislation to the effect that such consignments which contain a certain percentage of disease must not be re-consigned out of the Transvaal.

"2. All consignments of potatoes which are found upon arrival to be infected with scab (*Chrysophyctis endobiotica*, Schil.), will not be

re-sorted, but will be destroyed immediately upon arrival in the Transvaal, and a copy of Government Notice referring to this disease is attached for your information.

"3. The Director of Customs has agreed to assist us in this matter, and all importers of potatoes must obtain a sorting order from the principal customs office at Johannesburg between the hours of 9 a.m. and 3 p.m. each day, and all monies must be paid into this office for such work.

"4. It must be distinctly understood that it will be impossible to have any consignments of seed or table potatoes re-sorted at the Border stations, viz., Volksrust, Vereeniging, and Christiana, on account of the fact that we have only one Inspector at each of these stations, and his time is fully occupied with the ordinary work of fruit and plant inspection.

"I have the honour to be, Sir, your obedient servant,

"F. B. SMITH,

"Director of Agriculture."

This is followed by a copy of Government Notice No. 646, 1909, which runs thus:—

GOVERNMENT NOTICE.

It is hereby notified for general information that His Excellency the Governor has, under the powers in him vested by Section 1 of Ordinance No. 16 of 1904, been pleased to make the following additional Regulation for preventing the introduction and spread of insect pests and plant diseases in this Colony.

F. B. SMITH,

Director of Agriculture.

Office of the Director of Agriculture,
Pretoria, 9th June, 1909.

Regulation.

On and after 1st September, 1909, no person shall introduce into this Colony from outside South Africa any consignment of potatoes unless accompanied by a certificate from the consignor stating fully in what country and district of that country the potatoes were grown, and also a certificate from the Board of Agriculture of the country in which the potatoes were grown, to the effect that the disease known as warty disease or black-scab, caused by the fungus *Chrysophlyctis endobiotica*, Schil., has not been declared to exist in the district from which the potatoes come. Any consignments not accompanied by such certificates will be liable to be seized and destroyed by the Département of Agriculture.

Winter Feed for Stock.

By E. J. MACMILLAN, B.S.A.,
Assistant Director of Agriculture, O.R.C.

*(A Paper read before the O.R.C. Agricultural Judges' Association,
June, 1909.*

THE problem of winter feed for stock is demanding increased attention year by year. In times past it was not so necessary for the farmer to provide a supply of feed for his stock. The farms were larger, fences were fewer, and the restrictions on the movement of stock not so great as to-day. The old plan of trekking to fresh pasture when feed became scanty is growing more and more impracticable. Besides, the development of the dairying industry has introduced a new factor in the feeding problem. Creameries have been established, and, if they are to be placed on a basis of permanent prosperity, cream must be produced and herds must be kept in milk the year round.

Sheep feeding in the winter season also demands attention when winter lambs are raised, and it is not only in the winter season but in time of drought that a supply of surplus stock food is necessary. The history of South Africa shows that there have been lean years as well as fat ones for farmers, years when the rains were delayed and the stock suffered, and in some instances died on the bare veld. These periods may occur again, and when they do come the stockman who has adopted the system of growing feed to supplement the veld pasture will undoubtedly fare the best.

Crops for the production of winter feed may be divided into two classes—those which are pastured or fed off the ground, and those that are stored until required. The advantages of the first-named class appeal to the average stock-farmer who has not the appliances and means at hand to store food.

GRASSES.

The search for a suitable winter grass has not been wholly successful in this Colony. Several grasses have been found to make a satisfactory growth in the first season, but before the lapse of another year they have been almost smothered by wild grasses and weeds. The veld grasses which have persisted under natural conditions are all susceptible to frost, and die down at the first approach of winter, and it seems difficult, if not impossible, to find a variety which will be equally resistant to drought and frost.

The grasses which have given the best results among the varieties tested at the Experimental Farms for winter feed are: Perennial Rye, Rescue Grass (*Bromus Unioloides*), and Tall Fescue (probably the same as Southey's Tussock grass). When sown at February 1st these are capable of producing a considerable amount of feed by the follow-July. Perennial Rye has given rather better results than the other two, but for a field crop the three varieties may be sown mixed together with advantage. About twenty pounds of seed should be sown per acre, and harrowed in with a light harrow on a seed bed which has previously been brought into a fine condition by ploughing and cultivation.

Grasses should be sown late in the season to escape the hot drying winds and sufficiently early to get a start before the frost comes. February meets these conditions best. Where it is desired to lay down old mealie lands to grass, good results can be obtained by sowing the seed between the rows of mealies just before the last cultivation is given. The mealie crop provides a shade for the young plants, which are thus enabled to get a favourable start. In a plot seeded to grass in this way at Grootvlei last year, there are now bunches of Rye and Rescue grass looking quite green and standing three to four inches high though the ground was chiefly occupied by native grasses during the summer.

Perennial Rye readily forms tufts and produces a thick growth of fine, soft dark green leaves. It withstands frost without injury as long as there is any appreciable amount of moisture remaining in the ground. On rich soil it responds with an abundant growth. A plot sown at Grootvlei in February bears tufts six inches high at date.

Rescue grass, the Prairie grass of Australia, properly called *Bromus Unioloides*, is very hardy and grows throughout the winter season. It is distinguished by a broad leaf, and bears somewhat sprawling stems, with heads which look not unlike flattened oat heads.

Tall Fescue in its manner of growth resembles Rye grass but is stronger and coarser in the leaf. It resists frost and furnishes seed of good quality.

Phalaris, the new Canary grass, introduced into South Africa from Australia, is said to be both drought and frost resisting. A plot of this is under trial at Grootvlei. It is yet too soon to speak definitely of its possibilities, but, so far, it has not shown any advantages over Perennial Rye and Rescue grass sown on adjoining plots at the same time.

Meadow Fescue and Italian Rye grass are also suitable to be sown for winter pasturage.

WINTER OATS.

In the grain-growing districts winter oats may be used to provide pasturage, especially for sheep, during a great part of the winter sea-

son. The English winter (dun-coloured grain) is a suitable variety to be sown for this purpose. The seed should be put in the ground at March 1st. In the average season the crop will then be ready for stocking in the beginning of June. Four pecks of seed are sufficient to sow an acre. When the season is favourable a crop of grain may be secured. It is not advisable to keep stock on the crop later than August 1st, if importance is attached to the grain harvest.

BURNET.

Burnet is a hardy perennial which withstands frosts and makes a good growth in the winter season. It is inclined to become woody when mature, but it is, nevertheless, valuable as a food for sheep. It is one of the most successful of the new perennials introduced. The quality of pasturage is very fair. Its chief value lies in the fact that it grows and remains green throughout the winter, and during severe drought.

To produce winter pasturage, Burnet should be sown in January. A plot of six acres sown at Grootvlei in January last is now almost covering the ground with bunches of green herbage three to four inches high. Better results have been obtained from sowing in 18in. rows than from broadcast seeding, though the latter has by no means proved a failure; about 15 lbs. of seed should be allowed per acre.

The following yield was obtained from a small plot of Burnet established in December, 1907:—

Date of Cutting—					Weight of green crop per acre.
					lbs.
September 23	...	...	...	...	5,650
November 21	...	...	...	...	1,400
January 25	...	...	...	...	3,000

The cutting made on September 23rd was mainly the result of winter growth, and serves to show how this plant produces in the winter.

SAINFROID.

Sainfoin furnishes feed of finer quality than Burnet, and, being one of the Leguminosae, it is also a better soil improver. It has been proved difficult to establish as a field crop, though favourable results have been got by means of its cultivation in small plots. It is a perennial and withstands frosts; therefore, if some practical method of extensive cultivation can be found, it should prove a valuable addition to the list of forage plants for the High Veld.

Three cuttings were obtained from a small plot at Grootvlei last season, the yield of green fodder being as follows:—

Date of Cutting—					Weight of green crop per acre. lbs.
September 5	...	...	...	...	5,100
November 10	...	...	...	...	1,500
January 20	...	...	...	...	2,250

Sainfoin has proved about equal to Burnet in the amount of fodder produced. The heaviest cutting, it will be observed, was the first, showing good winter and early spring growth. Sowing in the latter part of March is to be recommended, quantity of seed per acre, 20 lbs.

This plant must be considered as still in the experimental stage under O.R.C. conditions, and further trials are necessary to demonstrate whether it is to be relied on as a general forage crop.

SALTBUSH.

Australian saltbush has proved its value as a forage plant in trials made at Grootvlei during the past four years. It is a splendid drought resister when once established, and it is available as feed for cattle and sheep either in times of severe drought or in the winter, when the veld is brown and bare. Saltbush is particularly valuable for planting on shallow brak soils where many other crops will not grow, and, owing to its drought-resisting qualities, it is well suited to the western portions of the Colony. One variety—"Old Man"—stands out ahead of all others as the most suitable saltbush for cultivation under our conditions. It grows to a height of six feet, with branching woody stems, but bearing an abundance of shoots which are much relished by stock. Saltbush seed has been distributed throughout the Colony with varying results.

A number have succeeded in establishing it, while the majority have reported failures. In the latter case the difficulty appears to have been largely due to wrong or doubtful methods of planting. To ensure success the seed should be sown in tins, and when the plants are well up they should be transplanted into other tins or nursery beds, and finally set out in the ground when they are strong and in a flourishing condition. January or February, as rain permits, is the most favourable time for planting out. The ground should be well prepared previously by ploughing and harrowing. It is necessary to keep stock off the plantation for the first year.

RAPE.

Rape is a king among winter forage plants for the sheep farmer. When sown at intervals from February 15th to the end of April it can be relied on to produce a satisfactory growth, and will furnish a supply of green fodder throughout the winter season. There are two essential conditions necessary in the production of rape—moisture

to ensure a start for the crop, and a fairly fertile soil. Though it will grow on poor soils, it is not a satisfactory crop. Even in the driest portions of the Colony there is generally enough moisture in the ground at the end of February to give rape a good start. It is therefore suitable for general cultivation. The rape plant attains a full growth in three months from seeding. Thirteen tons of green crop per acre were produced at the Grootvlei Experimental Farm from a plot sown at March 1st. This piece of ground was well enriched with stable manure. Much less, or one-third of the above-mentioned yield, would furnish a profitable return as pasturage. For winter feeding rape should be sown in time to make a good growth before frosts set in. The plant is not injured by frost, but it grows very slowly in cold weather. To provide for early spring feed it is advisable to sow the seed in April.

The crop succeeds best grown in rows, which should be about 3 ft. apart, but the seed may also be sown broadcast with satisfactory results. The quantity of seed required is 5 lbs. broadcast, or 2 lbs. in rows.

When sown in rows and cultivated rape makes a strong growth, and may be cut and drawn to a paddock or yard for feeding; otherwise it may be treated as a pasture crop. Sheep may be conveniently pastured on rape enclosed in a field made of hurdles or wire netting, a small piece being allowed at a time and the enclosure being removed to a fresh portion of ground daily. This system, though somewhat troublesome, is the most economical of feed and also enriches the soil.

This crop is very suitable for ewes with winter lambs, but it may be fed with advantage to all classes of sheep, pigs, and cattle, except cows giving milk. It is a valuable fattening food: Merino lambs now being fed in a fattening experiment have gained 10 lbs. per head in four weeks, when allowed nothing but rape and grass veld.

Care is necessary when stock are first turned into rape to prevent bloating. They should not be allowed to gorge themselves with it when they have not been allowed other food for some time.

MANGELS.

Mangels are another useful crop which does not require storage, but may be fed from the field.

The mangel requires a long season in which to complete its growth, and should be sown not later than November. The roots will then be ready for feeding at the 1st of June. In trials made at the Experimental Farms mangels have proved superior to all other root crops in respect of drought-resisting qualities and yield.

During the past season as much as 26 tons per acre was obtained of the Giant Sugar Mangel.

STORED CROPS.

Hay.

Few farmers take advantage of the opportunities afforded by the summer crop of veld grass to store hay for winter feeding, yet this furnishes valuable feed if cut at the right time. The only special implements required are a mower and a rake. The great secret in making good hay is to cut early before stems have had time to become hard and unpalatable as feed. The Common Rooi grass, which forms the bulk of veld hay, should be cut whenever all of the heads are fully up. Stacking is a perfectly satisfactory method of storing hay until it is required.

Teff Grass Hay.

Teff grass is an annual, and valuable chiefly as a hay crop. It is of no advantage to use for pasturage in the summer season when veld feeding is good, and it is of no value for winter grazing, as it becomes withered after the first frost. The seed may be sown in October, and if rains are favourable the grass can be mowed twice in one season. In the portions of the Colony where rains are usually late it is suitable to be sown in January, and will then produce one cutting, which requires about ten weeks' growth.

The soil for Teff grass requires careful preparation by ploughing and harrowing until a fine surface is obtained. Then the seed should be sown broadcast at the rate of 3 lbs. per acre, and covered lightly by means of a light harrow or weeder.

Upwards of two tons of hay per acre were obtained from this crop at Grootvlei during the past season. Though not a winter grass, Teff possesses value for the production of hay, and should prove particularly useful for cultivation on small farms where the area of natural hay ground is limited.

Ensilage.

Any system of winter feeding which does not embrace ensilage may justly be considered incomplete. A well-filled ensilage pit or silo affords the stock farmer a means of tiding over many a period of drought or dry winter veld without loss of flesh or milk in the herd. Ensilage is pre-eminently a cattle good, but it may also be used in limited quantity to feed sheep. Almost any green crop may be made into ensilage, but all things considered there is no crop so suitable for the purpose as mealies.

In the O.R.C. few seasons are so unfavourable that it is impossible for the farmer to grow mealies for ensilage. It should be borne in mind, however, that mealies half-grown, green, and filled with water make feed of very poor quality, and that the crop should be approaching maturity before it is cut and placed in the silo. Ensilage has sometimes been condemned owing to the fact that it was made from an immature crop, which was no fault of the system.

Mealies for ensilage may be planted as late as January 1st, but it is better to place the limit of planting a month earlier, as the prospects of securing a well-matured crop and getting it gathered before frost are thereby much improved. A little frost causing withering of the leaves does no harm. For good ensilage the material should retain much of its green colour and be free from any trace of mould. Its characteristic odour is like that of fresh malt.

A mealie crop which will yield five bags of grain per acre produces approximately five tons of ensilage. Ten tons per acre of ensilage may easily be obtained in a favourable season on good land. Four tons of ensilage are equal in feeding value to one ton of good oat hay.

It has been shown by experiments at the Tweespruit Experimental Farm that the cost to grow mealies and store the crop in the silo does not exceed 10s. per ton. The comparative cheapness of a ration based on ensilage is here made apparent.

Another advantage of this form of feed is that it can be kept from one year to the next without loss by deterioration. If the contents of the silo be not all required in the course of winter feeding the material will be found very useful during a summer drought.

Ensilage forms an excellent feed for the dairy cow, and can be recommended to farmers in the dairying districts without hesitation. The storing of ensilage is one of the most necessary steps towards the development of milk production in winter.

General.

The characters of the principal winter forage crops have been described in the foregoing chapters, and it may seem to the farmer that too many varieties have been recommended.

In conclusion it may be said, without doubt, that ensilage and rape are the outstanding winter feeds for cattle and sheep respectively. Hay, whether from wild or cultivated grass, is of good value, and hay-making is worthy of much more attention than it receives at present.

The grasses and other forage plants mentioned are deserving of a trial. To any person who wishes to lay down a permanent winter pasture the following mixture can be recommended: Burnet 5 lbs., Sainfoin 5 lbs., Perennial Rye 3 lbs., Tall Fescue 3 lbs., and Rescue grass 5 lbs., total 21 lbs. per acre. The cost of seed when purchased in quantities will amount to about £1 per acre. There is reason to believe that permanent winter pasture will prove fairly successful in the eastern portions of the O.R.C. In the drier districts rape may be sown annually to fulfil much the same purposes.

During the summer succeeding the sowing of the seed it will be found that wild grasses tend to crowd upon the introduced varieties, and when the frosts come will leave the field burdened with dry stalks. Mowing is the best remedy for this difficulty, the operation to be done not later than the end of January.

Fruit Fly Control.

DURING several years past the Eastern Province Entomologist of the Cape (Mr. C. W. Mally) has devoted considerable time and attention to the control of the most pestivorous of all South African fruit-pests, the Fruit Fly.

In the course of his labours Mr. Mally has, we understand, given considerable attention to the numerous devices and recommendations which have been put forward from time to time, and, as the result of his investigations, now gives prominence to that of poisoning the adult flies.

It is well known that fruit flies breed prolifically all the summer through in almost every fruit as it ripens, and their increase is only checked during the colder months and by the absence of food supplies. In Natal, the fruit fly is less abundant in winter than in summer, but it develops to a great extent in oranges and naartjes, particularly on the Coast; at the same time throughout a great part of the Colony where these fruits are not abundant or entirely absent the winter is not, as a rule, sufficiently severe to materially reduce the potency of the pest, the adult flies seemingly having little difficulty in living over in sufficient numbers to breed up into a considerable force so soon as the main summer crops come on.

Whilst there is no difficulty in explaining the ascendancy of the pest within the Coast belt and Midlands it is no easy matter to account for the maintenance of the fruit fly in many up-country orchards, although it is a notorious fact that the more evergreen shelter there is surrounding or adjacent to an orchard the more abundant the insect is.

According to the latest advices we have seen, Mr. Mally advocates the treatment for a time when food supplies are least abundant, and one cannot do better than quote in full the seasonable note before us. Many fruit-growers, having read through Mr. Mally's remarks which follow, will ask what they are to do considering that they have no citrus trees to attract the fly at the particular time of year when the treatment promises to be most advantageous. In this connection one can only suggest that all susceptible fruit trees should be similarly treated well before the ripening of the fruits, upon the assumption that such trees will be frequented about that time by flies awaiting a suitable conditions of the fruit to pierce it and lay the eggs therein.

Mr. Mally says:—Large numbers of fruit fly maggots, developed in the stone fruits during the summer, have emerged as flies, and are now attacking citrus fruits as they begin to ripen. In several orchards

visited, numbers of the flies could be seen on the trees and many of the ripest oranges had been punctured. Although comparatively few, if any, of the eggs are developing at this time, the puncture in the fruit induces premature ripening and leaves an injury which may seriously affect its keeping qualities. As pointed out by Mr. L. J. Roberts, of "Cottesbrook," near Kroomie, this is especially important in connection with the export trade in citrus fruits, because the punctured spots provide an entrance for the "Blue Mould," which is often the cause of loss in the fruit in storage or in transit. Even though the utmost care is exercised so as not to injure the fruit in picking or handling it, the danger of loss from "Blue Mould" is still an important factor unless the fruit fly is kept under control. Punctures made while the fruit is still of a uniform green colour can be detected by the yellowing of the tissue immediately surrounding them, so that damaged fruits can easily be detected in that stage. But as the fruit ripens, these injured spots are not so easily detected unless they have advanced to the stage where they show as small brownish spots. Punctures made when the fruit is turning yellow in the ordinary course of ripening are so difficult to detect that they cannot be culled out in packing for export. Besides, the mere fact of culling them out means such a heavy loss in otherwise sound fruit that the per cent. of culls is an important item.

Although a certain amount of damage has already been done in the earlier portion of the crop, the bulk of the crop in most localities is still sound and can be protected by prompt action in applying the poisoned bait for the destruction of the flies.

The bait should be made as follows:—

Sugar (cheapest grade)	3 pounds.
Arsenate of Lead	4 ounces.
Water (hot or cold)	5 gallons.

Dissolve the sugar and arsenate of lead in the water and keep well stirred during the application. Apply a light sprinkling of the bait evenly over each tree by means of a common brass garden syringe (20 in. x 1½ in.), using the finest rose. About one syringe full is sufficient for a large tree. The application should be repeated immediately after each rain, at least until the flies have been brought under control. During the fine weather the application need not be repeated so long as the specks of sweet can be seen on the leaves, or about once a fortnight.

There is no danger of poisoning from eating the fruit, nor of destroying honey bees.

Moisture Requirements of Sugar Cane.

THE AMOUNT NEEDED FOR MAXIMUM DEVELOPMENT.

THE Hawaiian sugar planters have probably done more and better work in irrigating sugar cane than any other people. In a bulletin on the subject Mr. J. T. Crawley, the Director of the Cuba "Estacion Central Agronomica," remarks that in Hawaii no one knows exactly the amount of water that is used on a given area of land, for the reason that accurate measurements are not taken; but the approximate quantity is known from the daily capacity of the pumps and of the streams whose waters are utilised and this approximation is sufficiently accurate for general purposes. Where there is an annual rainfall of say 50 inches or less, the engineers estimate that 5,000,000 gallons of water will be sufficient for each acre of land. Now, 5,000,000 gallons per acre is equivalent to 184 inches of rainfall; to this add 50 inches of rainfall and we have a total of 234 inches of water to produce a crop of sugar.

This is often expressed in another way by saying that a pump of a million gallons capacity per day of 24 hours will be sufficient to irrigate 100 acres of cane. As the cane crop is irrigated 15 to 17 months, it will be seen that the formulas above referred to are not very different. Some plantations use more water than the above amounts and many use less, but it is safe to say that the average irrigated plantation in Hawaii uses above 150 inches of water per year, exclusive of rainfall, when this is small. The greater part of the rain falls in the winter time, when the temperature is low and the evaporation small on account of the low temperature, and when the growth of the cane is least. Irrigation is therefore more necessary, and more water is used in the summer when the temperature is high, the growth of the cane rapid, and the evaporation from the soil excessive.

Turning to Cuba, Mr. Crawley remarks that the conditions are quite different in that country, where most of the rain falls in the summer when the temperature is high and the growth of the cane most rapid, and when there is a large amount of evaporation from the soil. "Here, therefore, the rain falls at the time most needed and when it will do the greatest good, whereas in Hawaii it falls at the time when least needed and when it does the least good. The practical consequences are that the growing of cane in Hawaii without irrigation in places where the rainfall does not exceed 50 inches per year is exceedingly uncertain, whereas in Cuba this same amount of rainfall produces a fair crop if well distributed throughout what is called the rainy season.

"It will be seen then that there will not be needed as much irrigation in Cuba as in Hawaii. Cane, however, is a crop that needs a great deal of water, and it needs it regularly. One hundred inches of water, if applied at regular intervals, and in quantities proportional to the necessities of the cane, would probably be sufficient; but, considering the fact, as will be clearly brought out later, that the rainfall comes at very irregular intervals and often in such quantity that a great deal of it is lost either by surface run-off or by seepage, it is probable that at least 125 inches of water, including the rain, will be required for the full development of the cane. The writer is of the opinion that whenever the rainfall is less than 5 inches per month, the cane will suffer, and that during the summer time this should be at least 8 inches well distributed, or the cane will not develop properly. This statement can be only of general application since the nature of the soil, its power to absorb and retain moisture, the character of the subsoil, are all factors that have a material bearing on the subject."

Value of Home Experiments.

PERHAPS one of the things that the average farmer hates most is an experiment. The very mention of it to him seems to convey some idea of inexperience, and for that reason, if for no other, he leaves experimenting alone. And yet how often he could be helping himself! For however good his crops may be looking, there are few which could not be improved a bit, and he is a happy man who possesses all good crops.

In *Farm, Field and Fireside* for July 9th Mr. S. James discusses this subject, and shows what a farmer might do in the direction of advancing his knowledge of his own particular farm and the peculiarities of its soil. For instance, with artificial manures, he recommends that when these are bought, the land should be dressed, in marked portions, with varying quantities, and some part should be left with none. The evidence of one's own eyes would then obviously persuade us whether the particular manure answered buying or not in future. Or if expense

had to be more or less studied, let the experiment be carried out on a small plot with about a hundredweight.

Each farmer has, as a rule, his own particular fancies for these artificial manures; fancying gas lime, nitrate of soda, superphosphate, kainit, basic slag, or, as the case may be, without any consideration as to whether it is the best for the purpose. These, we think it is wise to say, ought certainly to try their theory on a small piece of land first, and, if it is successful, to carry out the principle on a larger scale later on.

If a farmer can be made to see that this or that manure answers to buy (and he does not buy for the pleasure of buying) he will become a purchaser, but he must be convinced about it, and on his own farm. To this end we think that the manufacture of these different manures would be doing well and benefiting themselves if they offered better terms for the sake of experiments being carried on by likely customers, under certain conditions, which could be laid down. Even if the first sample were given free, it should (if the stuff was anything like what was claimed for it) make the user see its advantages and become a regular customer.

When wool will pay all expenses of keep, whatever growth the sheep are making, whatever lambs they are raising, may be counted as profit. If the sheep are worth no more at the close of the year than they were at the beginning, there will be no profit. It is not only important that the flock as a whole should gain in value, but each sheep of the flock should be gaining. It is better to cull at an early age, and not wait until a sheep has lost you money before it is sold.

The General Manager of Railways notifies us that, with effect from August 9th, 1909, South African lucerne, *pressed in bales*, consigned from any N.G.R. Station to Durban in lots of not less than 10 tons, will be conveyed at the No. 11 rate at owner's risk. This rate does not include delivery, and owners will be required to load and off-load the traffic. Consignments of less than 10 tons will be charged at the No. 6, South African produce "C" rate. The special rates for South African lucerne to Durban and Maritzburg at present in force will on and from the above date be cancelled.

Ostrich Farming.

NATAL'S POSSIBILITIES.

LECTURE BY MR. R. W. THORNTON.

THE possibilities of ostrich farming in Natal have lately been the subject of much discussion among leading farmers of the Colony as well as in official circles, as a result of the visit of Mr. R. W. Thornton, the Government Agriculturist of the Cape Colony and ostrich expert, who was "borrowed" by Mr. Deane from the Cape Government for the purpose of ascertaining his opinion as to the possibilities of Natal generally in the direction of ostrich farming and the suitability of certain lands in particular for this branch of farming. Mr. Thornton visited Natal in January, and inspected a considerable area of land in the Weenen and Umvoti counties. His report is now in the hands of the Government, and some reference to it, as well as to ostrich farming generally, will be found in our leading article in this issue of the *Journal*.

On the 28th July Mr. Thornton delivered an interesting lecture at Durban, in the course of which he gave his opinion as to the possibilities of Natal in the direction of ostrich farming. The lecture had been arranged by the Durban and Coast Society of Agriculture and Industry, and the chair was taken by Mr. E. W. Evans, the president of the Society. Unfortunately a representative of the *Journal* was unable to be present, but we have made use of the *Natal Mercury's* notes in drawing up the report which follows.

The Chairman, who was received with applause, said perhaps it was advisable, in introducing Mr. Thornton, to offer a few explanatory remarks. There had been few ostriches kept in Natal for the past twenty years, and it was only within the last two or three years that a few men had realised that there were possibilities in ostrich-farming quite undreamed of. Those few men had kept in touch with other parts of South Africa where ostrich-farming had been a pronounced success, and the result of that had been that Mr. Deane, who was always willing to encourage anything that tended for the prosperity of Natal, took an interest in the matter, and he applied to the Cape Colony Government, and they in turn were courteous enough to allow Mr. Thornton, the lecturer that night, to come to Natal for a month and place his services at the disposal of the Natal Government. Mr. Thornton had spent his time in inspecting the land which was thought to

be most suitable for the breeding of ostriches, and he (the chairman) might say, in short, that he had found the spots he had visited suitable beyond his anticipations. The result would be, he hoped, that within a reasonable time they would see, probably under Government auspices, the establishment of ostrich-farming on a small scale, but in a way that would mean success if carried out in the future, and in that respect it would be necessary to follow out closely proper lines on which the farming would have to be conducted. In the Cape Colony, Port Elizabeth was the port where the ostrich feathers were received and distributed, and that industry had contributed in no small part to the prosperity of Port Elizabeth. (Applause.) There they had a large feather hall, where three times a week they held sales throughout the entire year. On behalf of the Durban and Coast Agricultural Society, he (the Chairman) arranged that lecture, in the hope that the Durban people would have acumen enough to see what the town would gain in connection with the establishment of this industry. (Applause.) The welfare of the Colony would be increased by this new industry, and, personally, he was sanguine enough to believe that it was going to be one of the big things of this Colony within the next twenty years. (Applause.) He would call on Mr. Thornton to address the meeting. (Applause.)

Mr. Thornton, in the course of a brief but illuminating address, said he had gone through a portion of the Colony which had been considered as most suitable for ostrich-farming. He started from Weenen, and had been through Impanza, up the Mooi River, and back to Greytown; and he had been as far as Winterton, through to Bergville. The thorn country, along the rivers, was as good, and better, for ostrich-farming than almost any part he had seen in the old Colony—Cape Colony. (Applause.) There were a combination of conditions seldom met with, except on a very small scale, at the Cape—that was, land suitable for lucerne, a permanent water supply, and a suitable climate. In the old Colony they had not always got a water supply on the coast where their land was suitable for lucerne; and where their land was unsuitable for lucerne they frequently had not got the water supply. It was almost impossible for him to estimate the extent of ground capable of carrying ostriches, but there were thousands of acres in the Tugela Valley suitable, which were capable of growing lucerne. There was a great deal of land not under water, but which could be put under water, and if it could not be put permanently under water, it could be placed under flood water. In the Old Colony they had to grow a large proportion of their lucerne by means of flood water, and that was precarious. But here they had conditions made for them by nature. They had a permanent supply of water, and the land was good, which meant that they could get their

four or five crops according to the altitude above sea level; and they could work out exactly the number of birds they could run per acre. In the Old Colony they reckoned five birds to each acre, and in Natal they could reckon about the same number, and possibly even more, because the outside veld was excellent, and in addition they had splendid mealie land. Taking 10,000 acres of land, and putting it at four birds to the acre instead of five, and presuming that the birds would bring in £4 a bird, it meant that they would have an income from that land of £160,000 per annum, which was not to be sneered at in these hard times. He had mentioned £4; but it was held in the Cape that a bird was not worth running unless it was going to produce £5 a clipping, and, reckoning three clippings in two years, the return would be £28 an acre. Unfortunately in the Old Colony they had a great number of indifferent birds, but if the industry in Natal were established only the best birds must be produced, and, the industry being a new one, they would have every opportunity of seeing that indifferent birds were not introduced. If Natal once got a good name for feathers, there was no reason why Natal, or Durban, should not take the first place in the feather markets. Applause.) At present the few feathers that were produced here were sent to Port Elizabeth to be sold, but if the industry became established here it would be the buyers that would buy from the producers, by telling them what class of feathers to produce. Proceeding, Mr. Thornton dealt with the type of feather required. The average weekly sales in Port Elizabeth were, in 1903, over £6,000 per week. The income in Cape Colony from the industry in 1865 was £65,726, the weight of the feathers being 17,522 lbs., and that worked out at £3 15s. per lb. In 1875 feathers were exported to the value of £304,933, representing 49,569 lbs., which worked out at £6 5s. per lb., and that constituted a record. In 1888 they had what was known as the "big smash," and prices went down to £1 6s. 8d. per lb. That sum had gradually increased, and in 1904 they exported feathers to the value of £1,058,988, representing 358,370 lbs. of feathers, which worked out at £2 5s. per lb. In 1907 the total number of birds was 455,825. Feathers were exported to the amount of 598,297 lbs., and the value was £1,819,606; the value per lb. being £3 0s. 10d., and the value per bird was £3 9s.

They had been trying in the Cape Colony to improve their birds, but the proportion of bad birds was so great that there was a danger of harming their markets. The market value of common feathers had fallen, owing to a better appreciation on the part of the buying public of the best feathers. If Natal did not legislate, the chances were that the Colony would be a dumping-ground for the bad birds of the Cape. With regard to actual ostrich-farming, the price for a good set of

breeding birds in Cape Colony to-day was about £400—that was, two hens and one cock—and those birds were from birds that money could hardly buy. Six birds from the best strains could be bought for £10 each, and these when fourteen months old would bring in £4 per bird for the first clip, and £5 per bird for the second. For a man with a small farm it would perhaps be better to go in for a number of good chicks. Supposing he bought twenty, it was quite possible he would be able to get six out of them as good as could wish to have for breeding purposes, and the remainder would be first-class clipping birds. It was risky to buy a single set of birds only, for if the cock died the venture would be handicapped. In the Old Colony the greater number of birds were studded, and he advised a similar system being followed in Natal. In Cape Colony a number of farmers went in for allowing the birds to hatch naturally, but those with very good birds preferred the incubating process, which was safer. Having gone into the details of ostrich-rearing, the lecturer said the best method was to allow the young birds to run with the old. In the Cape Colony there was very little labour attached to ostrich-farming, even where hand-feeding was resorted to, two boys being quite able to feed 200 birds, and after the clip all the farmer did was to pack the feathers and send them to the sorter, getting a cheque in return. Allowing birds to run on lucerne saved trouble, and did not cost so much, but one of the greatest disadvantages was that the bird shortened the life of the lucerne, and the want of a change of diet was not in the interests of the birds' health. In Natal, in the parts he had visited, they had the advantage over the Cape in having no great changes of temperature on lands suitable for ostrich-farming, and there was also a better supply of lucerne. In conclusion, Mr. Thornton reiterated the opinion that there was no reason why the ostrich industry should not become better in Natal than in Cape Colony, if taken up on right lines.

Mr. W. G. Baker, as an old Colonist and stock farmer, said he had made trials in the course of his farming experience with ostriches. He cordially supported the starting of ostrich-farming in Natal on a large scale. He was of opinion that under experienced and economical management, and with the selection of suitable ground and districts, ostrich-farming should pay in Natal, mimosa or thorn country being likely to suit best. He suggested the issuing of a prospectus for the formation of an ostrich-farming association, with shares at £5 each, and a nominal capital of £15,000. Suitable land could be got from the Government, with option of purchase.

A number of questions were asked by Messrs. W. G. Baker, M. S. Evans, Harrison, E. L. Acutt, and W. G. Brown.

In reply, Mr. Thornton said that the selection of birds for Natal would be one of the most important considerations. What he would

like was that those who wanted to buy good birds and good chicks should apply through the Natal Government, which in turn would communicate with the Cape Government, and the latter could arrange for the selection. The birds sent would be selected from different strains, and numbered, and instructions could be sent as to grading. Farmers would thus start off on the best possible lines. (Applause.) Prickly pear, though a good food in famine times, should be eradicated, if possible, because there were plenty of other things which an ostrich could be fed on. Still, prickly pear as a food was a good stand-by. The Transvaal at present was getting up breeding birds from Cape Colony. In Cape Colony they could not get good lucerne land under water under £40 per acre, and therefore on land of that description it would not pay to put inferior birds. They should put their best birds on, because the cost of upkeep was just the same as in the case of inferior birds. Common birds were not going to bring in more than £3 10s. a bird a clip; good birds, costing the same in upkeep, brought in double that figure. The 10,000 acres he had referred to in Natal were in the thorn country, all of which could be irrigated. There was a considerable area of dry lands adjoining upon which ostriches would run, but they would feed on the irrigated land. That 10,000 acres was partially Government land and partially privately-owned land. He did not think that the coast would ever prove suitable for ostriches. Cane-feeding for ostriches would do very well, especially in conjunction with lucerne.

To other queries, Mr. Thornton said ostriches acted as splendid gleaners on land which had been used for the growing of oats or other cereals.

A suggestion was made that a committee be appointed to go into the possibilities of ostrich-farming in Natal.

The Chairman pointed out that the Government intended to move in this matter when Mr. Thornton had reported, and would legislate to keep away indifferent birds, and see that the land was broken up into small areas, so that the small settler might have a chance as well as the big man. (Applause.) Within the next two or three months he (Mr. Evans) anticipated important developments.

Mr. Maurice Evans, M.L.A., congratulated the Government on moving in the matter. (Hear, hear.)

Mr. W. G. Brown, in proposing a vote of thanks to the chairman, said Mr. E. W. Evans took a keen interest in all agricultural matters, and he was glad that arrangements had been made for Mr. Thornton to speak on the subject of ostrich-farming. (Applause.)

A complimentary vote to the lecturer closed the successful proceedings.

Science and the Farmer.

NOTES BY FARMING EXPERTS.

ALL heavy and mucky soils are better for being thoroughly drained. If not naturally so, whether tiles should be laid or whether open drains will be effective must be determined by inspection in each particular case.—*George H. Tailyer (Farmers' Bulletin No. 266).*

FLESH-SHEEP.

The important fact in the breeding of sheep, that only the production of flesh and fat, but not that of wool, keeps equal pace with the quantity of food supplied, points out to the breeder that with moderate nourishment the production of wool only, but with rich and abundant nourishment the production of flesh predominates, or is at least equal.—*Alfred Hawkesworth ("Australian Sheep and Wool").*

COMPOSITION OF BUTTER.

Good butter should not contain more than 10 per cent. of water and 0·7 per cent. of curd, but fault cannot be found if the former does not exceed 12 per cent. and the latter 1 per cent. . . . The rancid flavour of bad or stale butter is believed to be owing to the decompositions of the glycerides of the fatty acids which is favoured by water, but checked for a time by salt or borax.—*James C. Morton ("The Dairy").*

MANURES.

The substances which remedy the defects of the soil without enriching it are called mineral manures, *viz.*: lime, chalk, limestone gravel, gypsum, marl and sea-weed. Mineral manures loosen a stiff soil, improve its texture, and quicken its sluggish powers. Mineral manures, especially lime, enter into the substance of certain classes of plants. For instance, lime is found in the grains of wheat, yet it can hardly be said to nourish the growing wheat, any more than the particles of lime which a laying hen picks up can nourish her, though it is necessary to her in forming the egg-shell. Barn is requisite to make dough ferment, yet, though it assists in making good bread, it does not make it more nourishing. By lime farmers mean limestone, or chalk burnt in a kalin; and quicklime means burnt lime before it has lost its caustic or burning power by exposure to the air or moisture.—*Martin Doyle ("Cottage and Dairy Farming").*

IRRIGATING AND MANURING.

He who hopes to sit at ease, and by applying irrigating water, and that alone, to his land, and by so doing to reap continual and rich harvests, will in time discover his blunder. Irrigation, without proper manuring, will quickly render fertile land barren, and convert the poorer lands into sterile and useless districts. Irrigation, with proper manuring, will convert the poorest soil into fertile land; will enable more profit to be made from a very small area than could be made from hundreds of acres without irrigation: and will bring certain harvests and sure profits to an industrious and contented people.—*John McKenzie* (*"Practical Irrigation"*).

BARN MANURE.

Applying barn manures is commonly practised for potatoes with profitable results. Lawes & Gilbert showed that only a small portion of the nitrogen of farm manures is taken up by the crop; thus, with an annual manuring of 15.5 tons per acre, containing 200 pounds of nitrogen, continued for twelve years, but 8.3 per cent. of the nitrogen was recovered in the crop. "These results seem to indicate that this crop is able to avail itself of a less proportion of the nitrogen of the manure than any other farm crop. Yet, in ordinary practice, farm-yard manure is not only largely relied upon for potatoes, but is often applied in larger quantities for them than for any other crop."—*Samuel Fraser* (*"The Potato"*).

HUMUS AND ITS VALUE.

Humus is a product of the decay of organic substances. When these undergo decomposition in the soil, humus is the intermediate product formed; that is, just before the resolution of the organic material into its component chemical parts. It is probably not too much to say that humus is the most important substance found in any fertile soil, and its presence may generally be taken as the index of fertility. The truth of this statement may be realised more fully when we remember the fact that all barren soils are lacking in the substance, and the chief difference between a barren and a sterile soil is usually a difference in humus content, not in the mineral ingredients.—*H. Harold Hume* (*"Citrus Fruits and their Culture"*).

Feed at regular hours and the fowls will be ready and waiting for their meal.

Natal Bee-Keepers' Association.

W. C. MITCHELL, Hon. Secretary, Cedara.

Correction in last month's notes, page 62, line 12, for 24, read 34.

Notice of Meeting.—A general meeting of members will be held on October 13th in a room which the Education Department hopes to be able to place at the disposal of the Association. Members will be advised definitely at a later date. Among other items on the agenda are the following:—(1) Revision of the rules and bye-laws; (2) Receive the report of the sub-committee appointed to deal with the question of affiliating with the South African Bee-Keepers' Association; (3) Discuss the question of legislation dealing with the importation of bees; (4) Consider a proposal to hold an annual show; (5) Discuss the question of marketing honey. The secretary will be unable to send an individual notice to each member. All members are asked to note the date and support the Association by being present at the meeting. The importance of the subjects to be discussed makes the presence of every member who can possibly get to Maritzburg imperative.

* * *

Members are asked to exchange their experiences and opinions through the medium of these pages.

* * *

Colonies that have wintered badly may be assisted by a careful spreading of the brood, *i.e.*, open out the frames containing brood, inserting an empty comb, already drawn out.

* * *

Never give more frames than can be covered by the bees. Insert division board between frames that are covered by the bees and the remainder.

* * *

Give weak colonies frames containing honey from stronger stocks that can spare it. Failing honey they may be assisted by feeding.

* * *

Thoroughly clean bottom boards, and, if not already done, paint your hives in dry weather.

* * *

Look out for swarms.

DISTRICT NOTES,

For the Month Ending August 15th, 1909.

Cedara.—Queens already settling down to some good solid work, many of the hives already containing five and six frames of brood. The cold snap we are just having, however, will probably put a check on brood-rearing for a few days. Bee-keepers will be sorry to hear that in our recent fire ten hives, belonging to students at the School of Agriculture, were completely destroyed. The farm apiary, however, had a lucky escape, although one hive had its side charred with the heat. Luckily this was a weak stock recently brought up from the coast and the frames occupied by the bees were on the cooler side of the hive, which probably saved the combs from being melted. *Itengwas* (starlings?) have been giving some trouble, but after shooting one the rest decamped. Very little pollen is being gathered, but artificial pollen was refused even when dusted on to flowers that were being visited by the bees.

Hilton Road.—Colonies strong; one swarm out; mostly working on gum trees and garden flowers.

Malvern.—Colonies strong and active, but no swarms have so far appeared. Ants troublesome.

New Hanover.—Colonies very strong, but no swarms at date of writing. No pests noticeable. Pollen being gathered principally from chickweed and garden flowers. Bees at work on the gums but not storing surplus.

Camperdown.—General condition of colonies reported to be very good. Strong stocks storing surplus. Red pollen being gathered from wild aloe and mignonette. Mr. J. W. Gavin planted one pound of mignonette seed with eminently satisfactory results.

Glencoe Junction.—Very little of either nectar or pollen being gathered; what is being obtained comes from fruit trees, eucalyptus trees and tulip. The pollen is of a light yellow colour.

Ladysmith.—Some stocks reported as being very good, others only fair, but these were late swarms last season. Red and pale yellow pollen being obtained from aloes and gums; nectar from early gums, aloes and sage bush; this latter is found growing on the river banks, and Mr. Buhr notes that the bees appear to work on it very strongly.

Maritzburg.—Last season has proved an exceptionally bad one for bee-keepers in the City, many not obtaining a drop of honey. A species of wild apricot is reported by Mr. Fuller as swarming with bees. We all wish our brother bee-keepers in Maritzburg a better season this year.

Any bee-keeper who will oblige by sending in monthly notes of the doings of bees in his or her particular district can be supplied with proper forms for filling in by applying to the Apiarist, Cedara.

* * *

Any member of the Association having honey for sale is requested to communicate with the secretary, stating quantity and at the same time forwarding him a small sample.

* * *

Quotation.—"Swarming is the great trouble in modern bee-keeping; it is a bad legacy left us by the old-time skeppists. With the ancient straw hives and the old benighted methods of working, it was all very well. When bee-burning was the custom, and all the heaviest hives were fore-doomed to the sulphur pit, the best bees were those which gave the earliest and the largest swarms. The more stocks there were in the garden the more honey there would be for market. Swarming was encouraged in every possible way. And so, at last, the steady stay-at-home variety of honey-bee became exterminated, and only the inveterate swarmers were kept to carry on the strain." Tickner Edwardes, in "The Bee-Master of Warrilow."

* * *

THE CONTROL OF SWARMING.

Last month a few notes were given on the subject of fitting up the modern frame hive and dealing with any swarms which might occur. Mention was made that in actual practice it might be desirable to discourage swarming, or to obtain a still greater increase of colonies than Nature would provide.

To those who are beginners in the craft I wish to sound a warning note. Do not for one moment yield to ambition, during your first season, at any rate, to increase your apiary artificially. To every successful one there will be a dozen failures. Remember Oettl's golden rule, "Keep all colonies strong." One strong colony will always pay you better than two or three weak ones. For the first season be content with your one or two colonies; give them all the attention you can; watch the bees going in and out; note their behaviour and learn all you can about them; try and find out the reason for everything that you notice being done; some of the workers you will see coming home with loads of pollen on their legs, pollen of all colours, white, yellow and red of varying shades; observe where the bees are collecting this and note what flower produces each coloured pollen.

We want to keep our colonies strong; we know that if a swarm issues from a hive that colony will be considerably weakened; it is therefore

necessary that swarming be prevented if possible. How shall we set about it? Scientific bee-keeping has been aptly described as "knowing what the bees want to do and helping them to do it." We will apply this to the case in point. One of the most fruitful causes of bees swarming is want of room in the hive; the bees cannot increase the size of their habitation so they are driven to decrease the number of its inmates, hence swarming. By forestalling the bees' wants in this direction and giving them more space, swarming can be reduced to a minimum. Where the bee-keeper has several colonies frames of sealed brood may be taken from the strong colonies and given to the weaker ones to help to strengthen them up, substituting in place of the frames removed new frames containing full sheets of worker foundation or drawn-out comb. If only "starters" are given to a strong colony at this time there is danger of having a large number of drone cells built, which should always be discouraged except in selected colonies from which it is desired to procure mates for your virgin queens. Place fresh supers above the brood chamber in advance of the bees' requirements; keep the hive cool by shading and provision of sufficient ventilation. Attention to all these matters tends in the right direction.

In spite of all such precautions it will sometimes happen that a swarm will issue, in which case our only course will be to correct the mishap as far as lies in our power. Proceed as follows:—The hive from which the swarm has issued must be removed from its stand and placed close to its old site with the entrance facing in the opposite direction. On the old site place an empty hive with frames containing full sheets of wired foundation; remove the super from the old hive and place on the new hive; this new hive will then receive the returning bees that have been afield gathering stores; hive the swarm in the new hive as detailed in last month's notes. Now, open the old hive and destroy all queen cells, removing the unsealed broods to give to weak colonies. The sealed brood is then left in the hive, which should be contracted to conserve the warmth. In a few days this brood will have hatched, when the hive should be opened and all the bees brushed or shaken in front of the new hive, the empty combs being preserved for giving to other colonies whenever they may be required.

If the queen that issued with this swarm is an old one, and it is desired to supersede her, one of the cells should be left in the old hive to hatch. When this takes place cage the young queen in an introducing cage and place her among the bees in the new hive, at the same time destroying their queen. In selecting the queen cell which is to be left choose one of the largest, and preferably one which shows some indication of hatching very shortly—either the young queen inside may be heard piping or the cap of the cell may be partly pared off, leaving only a very thin covering.

Farm and Garden Notes for September.

By GEO. CARTER, F.R.H.S.

TOOWOOMBA CANARY GRASS.

THE sub-leader about this grass, and the article reprinted from the *Journal* of the Department of Agriculture, Victoria, will have been read with much interest by all farmers. I notice also an article on the same subject in the *Transvaal Agricultural Journal*, July issue, which is very similar in tone, and giving generally the same cautious conclusions. It is quite right that great caution should be exercised by farmers and others in purchasing new introductions, for many of these turn out to be worthless in actual practice. It is also quite possible that a thing which may be as good as gold in one country will be quite worthless in another; but, on the other hand, it is true most of the better class grasses, for instance, which are now doing very well indeed, have been introduced into South Africa by private enterprise on the part of some farmer, and there is no monopoly of wisdom in Government experts. *Paspalum*, the most valuable grass we have for most purposes, was introduced by a farmer, and one might mention many other items of interest of the same kind. I mention this point because I think the extreme caution exhibited with regard to this *phalaris* is not justified. The results of last year's trials, especially the results of the winter trials all over the high veld, have been far more satisfactory than our Government officials have any idea of, and I cannot but feel, from my close knowledge of the conditions under which the many trials were made, and of the great variance in climate and elevation under which the trials have been made, that the experimental stage is past. We have yet a good deal to learn about this grass, perhaps, but, this much we know, that in Toowoomba Canary Grass we have now a grass which will stand all the cold we have in South Africa; which is a tremendous yielder; which comes out exceedingly well in comparative analysis; which is perennial; and which is just as good in the midlands, and even on the coast, as it is higher up. I do not make this assertion on guess work, but after careful enquiries and investigations in the different districts; and I have particularly delayed saying this until now, because I wanted the trial of the full winter's cold to be completed. In answers to many enquiries I find that in such widely-separated districts as New Hanover, Lehlononi (East Griqualand), Polela, Highlands, Vryheid, Ermelo, Bethlehem, and Harrismith the reports exactly agree, most of the farmers

reporting going so far as to say that it will certainly be the winter grazing of the future all over the colder districts. The only failures reported are from European seed, which, of course, is not the Toowoomba Canary Grass. The Hon. Mr. Oliff tells me that it has done very well indeed at his Harrismith farm. The Director of Settlements, O.R.C., is so well satisfied with his recent inspection of the grass in the whole of the eastern part of the O.R.C. that seed is to be issued to all the settlers this spring. Plants two years old at Mr. McFie's midlands farm show not the least signs of failure. What more do we require in the experimental line. I have been enthusiastic from the first time I saw the grass, and now, after two years' experience of it, I feel as enthusiastic as ever, and long for the time to come when seed can be produced cheaply and in quantity, so that all farmers will be able to sow it largely.

The only objection I have heard at all is that this grass requires good land, and cultivation just at the beginning. But surely this cannot be looked upon as an objection worth mentioning. Are our farmers looking for a sort of terrestrial paradise, where any sort of grass will grow without any trouble or expense? If so, they are doomed to disappointment all along the line. I must point out once again that a crop of good grass is worth 50 per cent. more than a crop of mealies; that grass is by far the most valuable crop which this world grows; and that it is well worth good land, good manuring, and the very best care and attention. I can never understand how it is that, while all farmers are perfectly willing to manure a crop of mealies heavily, there is such a decided reluctance to spend a few shillings on manures for grass lands. Only in a very few cases have I seen this point really appreciated and applied in a business-like manner. To most farmers a pasture must be a crop which will grow spontaneously on the poorest land—land unfit for any other crop—or he will not consider it at all. If you have been looking upon it in this light, I challenge you to sit down quietly and make a careful comparison of values between an acre of mealies and an acre of good grass, and you will be astonished at the result. Take the results of this last winter in milk, or butter, or increase in sheep, in wool, and work it out on a business basis. We must look upon pasture grasses as a business proposition, not a something which is simply very nice to have during the winter months. If we look at phalaris in this light, this one objection falls to the ground, for it is well worth all the work it will give.

HELIANTI.

A good many enquiries have reached me recently about this "new" fodder plant. A circular has reached us during the last few days from the seedsman who is advertising and pushing this (Mr. Chas. W.

Marsters, of King's Lynn), and a few will be obtained for trial as soon as possible from him. Upon reading through the circular, which gives a fairly full description of the plant, I cannot but think Helianti is suspiciously like our old friend the Jerusalem Artichoke. But before saying more about it I will have it out here and report to readers who are interested in it at a later date.

HAWKSTONE OATS.

Mr. T. H. Hindle, of Willow Grange, again reports that his crop of this Oat has been entirely free from rust, and has done very well indeed. From what I have seen and heard of it there seems to be a good deal in its favour. There is no need to tell any farmer how great a value there is in the rust-resisting property of any Oat. So far the Algerian has been the only variety fairly free from this pest, and in many cases even it has been badly attacked. The "Hawkstone" takes about three and a half months to mature, is a somewhat heavier yielder than the old Cape, with an equally good head and straw, and a really beautiful forage when well reaped. Mr. Hindle, who has named this Oat after his own farm, got the first seed quite by accident, in a lot of imported Rye seed, some eight years ago. It was noticed that, while the Rye was so badly infested with rust as to be absolutely valueless, a few Oat plants in the crop were quite free and healthy. These few Oat plants were carefully reaped by hand, and in time planted again. Since then the variety has been planted at all times of the year, and in no case has rust appeared in any part of the crop. Some of our readers probably saw the resultant forage on the last Durban show, where Mr. Hindle won the "special" with a five-bale lot. This is worth watching and testing in other parts of the Colony.

THE VEGETABLE GARDEN.

The very cold snap of the middle of August, as unexpected as it was severe, will have played sad havoc with the earliest outside sowings of the more tender plants, such as Marrows, Cucumbers, and Tomatoes. It is always risky to get these up in August, but we will sow, for there is just a chance of no more frost, and these things are so very nice if we do succeed. Even the Potatoes planted at the end of July, which were just out of the ground, were very badly bitten, although these will probably recover. The wise gardener has generally a little reserve lot of such things as Tomatoes kept for such an emergency as this. This reserve must be put out now, and will probably be quite safe this time.

Full sowings of all kinds of vegetables may be made this month, particular attention being paid to those varieties which will only grow well in the summer. These will include Sugar Corn, Tomatoes, Mar-

rows, Cucumbers, and Beans. Runner Beans, which are far more delicate than the dwarf variety, should be delayed until the middle of September in the colder districts, but are now safe in the midlands. The first early cabbage, Wakefield, will be ready for transplanting. A fresh sowing of the summer varieties, Cape Sugar Loaf and Enfield Market, should be put in. The last transplanting of Onions sown in the autumn must now be done.

MUSK MELON.

Everybody desires to grow this delicious fruit, and it is tried in all sorts of unlikely places every spring. There is always much disappointment. Gardeners should remember that our Natal climate is not suitable, generally speaking, for Melon culture. Only in a very few places can it be grown, and even there only with great care.

The soil which is suitable is a rich, deep, sandy loam. Melons will not do at all in heavy clay soil. The exposure, also, must be the most sunny one available. Judging from many reports, I think that the most likely districts for Melons are those which we call "thorn" districts, such places as Muden and Weenen, which are below the mist belt, and which have a somewhat low rainfall in the summer. The one place in South Africa where they are really successful is the Western Province of the Cape Colony, where the heavy rains are during the winter, while the summer is comparatively dry and warm. Seeds are sown in hills slightly raised above the surrounding soil, in the same manner as Marrows, the "hills" being about six feet apart each way. Three plants are allowed to remain in each "hill." Terminal buds are to be nipped off, to encourage the growth of laterals, as most of the fruit is produced on the laterals. The ripening of the fruit is indicated chiefly by the scent, and also by the cracking and easy parting of the stem.

THE FLOWER GARDEN.

Dahlias should now be divided up as fast as growth shows, and the single tubers planted in the summer bed, four feet apart each way, a strong stake being placed at the same time with each tuber. Plenty of old and rotten manure should have been put into the ground just before planting. Beware of new manure in this case, as it will produce lots of foliage and stem at the expense of flowers. Those who desire to have extra good blooms this summer must remember that one cannot obtain both a large number of flowers and perfect specimens at the same time. Stems should be limited in number to two, in the first place, these being carefully and securely tied to the stake as they develop, and when the buds show they should be thinned out to about eight on the one plant. An occasional application of liquid manure will be found very beneficial at the "bud" stage and later. Most growers, however, prefer a great mass of bloom to a few very choice

ones, for after all the Dahlia is more adapted for garden decoration than for cutting.

I am afraid that many people are disappointed at the result from seed. It is true that just occasionally a good type may be obtained in this way, but one might almost say that it is impossible for the amateur gardener to succeed from seed. Only in places where it is impossible to get bulbs should seed be sown, and there the best results will be obtained from the little "Pompon" class. The wisest plan is to get a few good bulbs of named varieties from the nurseryman, for these will always give satisfaction. In choosing varieties consider whether you require them for specimen blooms or for garden decoration, for some of the very best of the show blooms are borne on short stems, almost hidden in foliage, and are of no use for decoration. For a blaze of colour nothing is better than the Pompon class. Amongst the newer Cactus varieties I like *Delicatissima* the best of all, for colour and free blooming, although the shape of the petals is not all that could be desired. Quite a new class, the Paeony flowered, is very popular in England just now, and these should be available this year in Natal.

September is quite the best month for bedding out *Salvias*, Ivy-leaved *Pelargoniums*, etc. These will bloom right along until the frost time, and should have as long a season as possible. Seeds of all the more tender annuals may be sown now.

Chrysanthemum cuttings may be taken all through this month, as they become large enough for the purpose. As the young plants get well rooted and strong old plants should be rooted out.

We have received from Messrs. Brinkworth & Sons, the well-known firm of potato raisers and experts, of Southampton, England, a copy of their latest catalogue. Messrs. Brinkworth & Sons make potato-growing for export a speciality; and their productions are consequently of particular interest to the South African farmer. In this connection we notice that they pay freight and insurance to Capetown, East London, Port Elizabeth, Durban and Delagoa Bay for orders of 20 cases and upwards. The catalogue includes the names of a considerable number of new and popular potatoes—over fifty altogether—and descriptions of "the twelve best potatoes in the world" are also given. Messrs. Brinkworth will probably be pleased to send a copy of the catalogue to anyone interested.

The Position of East Coast Fever.

LIST OF OUTBREAKS DURING JULY-AUGUST.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 21st July to 20th August:—

Dundee District.—Outbreak on farm “Tiger Kloof.”

Weenen District.—Outbreak on farms “Blinkwater” and “Krantzkop.”

Umvoti District.—Outbreaks on farms “Pinedale,” Mr. T. Dawson’s portion of “Weltevreden,” “Bellevue,” “Petrus Vlei,” “Fairfield,” and “Chailey,” sub-division of “Wondeboom.”

Klip River District.—Outbreak on farms “Hond Klip,” sub-division of “Elands Laagte,” west of main line, and “Driefontein,” east of main line.

Krantzkop District.—Outbreaks on farms “Glen Erskine,” “Wonderfontein,” “Scotsdale,” and “Overschot.”

Umgeni District.—Outbreaks on farms “Thorney Bush,” sub-division of “Ockertskraal,” “Allandale,” “Rosedale,” “Ambleton,” “Garwin,” “Binchester Grange,” “Settle,” and “Lilliefontein.”

Lion’s River District.—Outbreak on farms “Linwood,” sub-division of “Ashby,” west of main line, “Lyndoch,” west of main line, “Breezy,” west of main line, “Fountaindale,” sub-division of “Eockeogat,” east of main line, “Horbl,” T. Hyslop’s cattle on “Groote Vallei,” west of main line, and amongst Government oxen on “Cedara,” west of main line.

New Hanover District.—Outbreaks amongst Natives’ cattle on farm “Zeekoehoek,” and on farms “Klein Waterfall,” “Sproxton,” “Canthorpe,” “Dornkop,” W. H. Westbrook’s portion of “Camel Hoek,” “Impolweni Mission Station,” “Moe’s Rest” sub-division of “Wilgespruit,” “River-side” sub-division of “Camel Hoek,” “Lilienthal” sub-division of “Dalton,” E. Boast’s cattle, York, “Boilingfontein,” “New Hanover” sub-division of “Welverdiend,” and “Ambleside.”

Camperdown District.—Outbreaks on farms Thornville Junction of “Lilliefontein,” and Cato Estate sub-division of “Reit Valley.”

Upper Unkomanzi District.—Outbreak on farm “Brasfort Park.”

Ixopo District.—Outbreaks on farms “Philpots Estate,” “Doornvlatge,” “Zondag Kloof,” “Vaalkrans,” “G. D.,” “Smithfield,” “Herds-town” sub-division of “Cothill,” and “Inhlamveni.”

Lower Umzimkulu District.—Outbreak on Elim Mission Station.

No record is kept of outbreaks in the following Magisterial Divisions: The whole of the Province of Zululand, the whole of Victoria County, Umsinga, Vryheid, Ngotshe, Babanango, and Paulpietersburg.

A Mealie-Husking Peg.

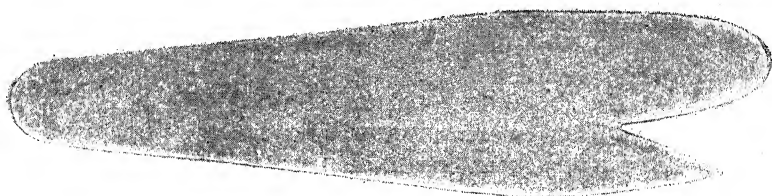
A USEFUL IDEA.

THE illustrations which we print herewith will, we think, prove of interest to most of our readers—in fact, to all who are growers, in however small a way, of mealies for grain.

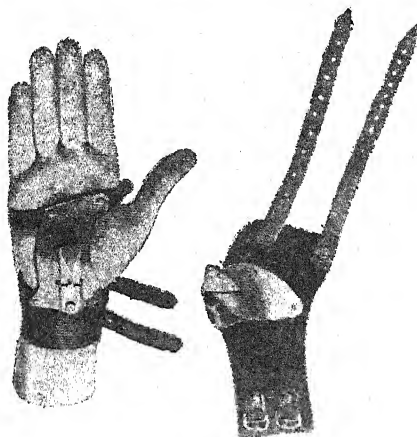
The first of these illustrations we have drawn from an unfinished and a finished husking peg which has been designed by Mr. W. Mapstone, who needs no introduction to readers of this journal. Mr. W. Mapstone called at our office recently and kindly left us samples of his husking peg, which he thought would be of interest to our readers. The peg is made of hoop-iron, cut to the shape shown on the top in the first illustration. The longest length is $6\frac{1}{2}$ inches, and the width in the broadest part $1\frac{1}{2}$ inches. The piece of iron, after having been cut to this shape and the edges trimmed with a file, is next bent as shown at the bottom in the same illustration, and the peg is ready for use. As will be seen, it is simple in construction, and so within the sphere of any farmer's abilities; and at the same time it is strong and effective.

The husking peg is held in the right hand, the curved portions going over the fore-finger and little finger respectively to the back of the hand. Held thus, the point appears a little above the forefinger and opposite the thumb, which is used in conjunction with it in grasping and jerking off the husks from the mealie-cobs, the point of the pegs, of course, being inserted through the husks, at the top of the cob, and half the husks pulled off at a time with a downward jerk.

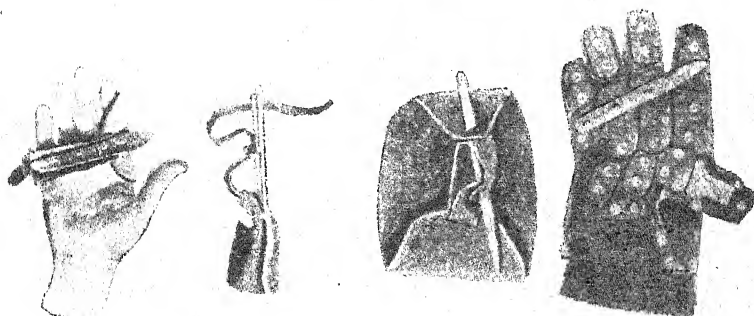
We depict other forms of husking pegs and hooks in the other two illustrations (which we have taken from a United States publication—U.S. Department of Agriculture, Farmers' Bulletin No. 313), but it will be seen that Mr. Mapstone's husking peg is much to be preferred—at least in a hot climate like ours, where the use of gloves would be most uncomfortable. Mr. Mapstone's peg is also evidently cheaper.



MR. MAPSTONE'S HUSKING PEG.



HUSKING HOOKS.



SPECIMENS OF AMERICAN HUSKING PEGS.

Exchange Reviews.

“The Cape Garden.”

SOME two years ago a pamphlet on gardening entitled the “Cape Peninsula Amateur Gardener” was published by the Suburban Amateur and the Sea Point Horticultural Societies. This pamphlet proved of great assistance to a large number of persons, and the circulation steadily increased. Its discontinuance after a successful year was greatly deplored. The Sea Point Horticultural Society, feeling that the publication is necessary, has decided to undertake the responsibility of starting afresh and their endeavours have resulted in the issue of a monthly magazine, the first number of which has reached us. We hope that their enterprise will receive the support of all who have the interests of horticulture at heart. The small sum of 3s. 6d. per annum will secure to the subscriber the monthly receipt of not only a calendar of hints for the month’s work, but also news of the current work in the horticultural world and general information on plants and flowers most generally grown.

Manuring of Fruit Trees.

The *Cape Garden* (to the inception of which we refer in the preceding note) contains a useful article on the “Manuring of Fruit Trees.” There is a notion that fruit trees do not require manure, which no doubt is due to the fact that many, even without any special manuring, occasionally give good yields. Furthermore, many believe that a fruit tree which has borne well one year cannot give any yield the next or even the following year, because, as some say, it needs rest. To show that neither of these opinions are correct, it need simply be stated that the fruit tree is subject to the same laws, as regards its nourishment, as any other plant. When the nutrients which are present to a limited extent in the soil have been used up, they must be restored to the soil, *i.e.*, the soil must be manured. The reason why a tree which has yielded well one year generally bears very little or not at all the next year is also capable of a simple explanation, namely, that the necessary assimilable plant food is no longer available in the soil, and the tree cannot again form fruit until the soil is rendered able to supply the food.

A fruit tree requires warmth, sunlight, and moisture as well as a number of other substances, which are taken partly from the air through the leaves and partly from the soil by means of the roots.

These substances are all indispensable to the prosperity of the fruit tree, and if one of them is entirely wanting the tree cannot possibly thrive. If one or more of these substances are present to only a limited extent the tree cannot take up the other nutrients—even if they are present in the soil—in quantities sufficient for their complete development. Thus it is that the yielding capabilities of a tree are regulated by that nutrient which is least present and available in the soil.

Gypsum as a Manure.

Bulletin No. 5, 1908, of the Colorado Agricultural Experiment Station contains the results of pot experiments, conducted by T. Takeuchi, with peas, beans, oats, rice, and spinach in which gypsum was used in connection with ammonium sulphate, sodium nitrate, lime nitrogen, potassium sulphate, and different forms of phosphoric acid.

It was observed that as a rule gypsum decreased the yield when used in connection with acid fertilisers and increased the yield when used with alkaline fertilisers. Gypsum, therefore, appears to be a valuable addition to fertilisers which contain sodium nitrate or other substances which produce an alkaline reaction in the soil. If, however acid fertilisers, such as superphosphate and ammonium sulphate, are employed, gypsum is likely to decrease the yield. It was also found in these experiments that gypsum exerts a favourable influence in overcoming the injurious effect on plants of an excess of magnesia in the soil. In the case of spinach it was observed that applications of carbonate of lime were injurious while the gypsum was beneficial, provided the reaction of soil on fertiliser was not acid.

Sugar from Maize Stalks.

An interesting and suggestive article, on "Some Structural Peculiarities of Maize, and how they are related to the development and practical extraction of the sugar under the new treatment," is contributed to the *Louisiana Planter and Sugar Manufacturer* by Professor F. L. Stewart. Prof. Stewart commences by showing the resemblances and differences between maize, sugar cane, and the bamboo—"a triplet of gigantic grasses," as he terms them—and then proceeds to point out the special conditions under which maize increases its sugar content. Both maize and sugar cane are so constituted structurally and functionally, we learn, as to enable them to form and store away the food materials upon which their continued growth and existence depend. This they do in obedience to the same inexorable law and for the same purpose which leads the bee to store up honey within the cells of its hive. "Every physiologist recognises that there is con-

stantly resident within the living organism—the plant as well as the animal—an intelligent, administrative, directive energy, or source of energy, which adequately provides not only for its present, but also for its future probable needs. Not only so, but it is on the alert to meet emergencies when they come, and it has the prevision to anticipate and provide for extraordinary contingencies, and to repair accidental injuries, and particularly to remove or overcome any hindrances in the plant to its own self-perpetuation.”

The supreme crisis of its life comes to the maize plant when the immature ear is removed or destroyed. Promptly in that case, and heroically as we would say, if we think of it as an intelligent creation, an effort is organised to meet the emergency, to repair the loss, and to avert the impending catastrophe. To this end a reserve force which never in the ordinary life cycle of the plant has any such demand made upon it is then called into action. In brief, the result is that the plant at once enters upon an entirely new condition of development, and its efforts are rewarded with an indefinite prolongation of its life, with the purpose plainly of maturing a new ear; fresh stores of the precious food materials are produced with amazing rapidity and rushed into the natural receptacles provided for them within the stalk, until the sugar has accumulated to beyond one hundred per cent. more than it originally contained. “It is scarcely necessary to say that this transformation is brought about effectively only under intelligent human control, directed closely to the end in view. The results in sugar accumulation are then as uniform and constant as in the sugar cane in the tropics.”

The same machinery, it appears, cannot be used for maize-crushing as for sugar cane-crushing, owing to differences in the anatomical structure of the two plants. It is found, however, that combined with a crusher, a triplet of three roll mills, or, better still, a combined twelve roll mill, with about twenty-five per cent. maceration and the speed of the rolls perfectly regulated, can extract ninety-five per cent. of the total juice with much less expenditure of driving power than is used in eighty per cent. extraction from the southern cane. This is due largely to the fact that the silicious hardening of the stalk of maize does not begin until its growth is completed, or, in this case, until the period of saccharine development has passed; and also to the fact that the rind or outer shell of dry woody fibre which encloses the juice-bearing cells of the sugar cane is much thinner and much less dense in corn-cane. Hence it will readily be seen that in the latter case the hindrances to perfect extraction are much less than in the former.

Equally important with the sugar is the pulp and cellulose product, consisting of the *substance* of the *whole stalk* in a highly purified condition, after the sugar has been extracted, the whole of it ready to be resolved at once into the finest quality of pulp and cellulose. On account of the *absence*, in this case, of the *hard silicious coating which covers the cornstalk* when the grain has *ripened* and which prevents the best of the fibrous matter which it contains from being utilised, the pulp obtained is *doubled in quantity* and is of a much *superior quality*. "A necessary incident to the sugar process," Prof. Stewart concludes, "is the removal of the immature ears and husks from the stalk. This field stuff amounts to about eighty per cent. of the weight of the stalk, and adds a third class of products obtained from the same plant, utilised principally in the manufacture of food products and alcohol."

Saddle and Harness Horses.

Mr. P. R. Gordon compares the type of saddle and harness horses, in the *Queensland Country Life*, June issue. As he states, many people are of opinion that a perfect saddle and perfect harness horse may be combined in one and the same animal. Many horses, it is true, he remarks, represent a combination of the two, but, as has been pointed out by a well-known English authority, perfect riding horse shape and perfect harness shape cannot be combined in the same animal, as they are antagonistic in some important details. To begin with, a short back, which constitutes an indication of strength, is desirable in both types; but, while this qualification is an indispensable requirement in the riding horse, it is not of nearly so much importance in the harness horse. Closely-knit loins are a necessity as indicating their weight-carrying capacity, as all will agree a slack-loined horse cannot stay under a heavy weight. In the harness horse what, in the language of the stable, is called close coupling is not an indispensable necessity, and in some of the best harness horses there is often a tendency to slackness of loins or loose coupling.

In the matter of quarters, there is often a marked difference in the combination of the two. Those of the riding horse are lengthy, and what, in stable parlance, is termed "reaching," and the more that is so the better. There are two distinct types of light harness horses, namely, the buggy and the coacher. In the former the type is cobby and compact in shape and comparatively short, while the latter type have long and roomy quarters, and are further characterised by the croup being very level and long. It is in the fore quarters that the greatest difference exists between the saddle and the harness horse. In the hack type the shoulders are as sloping as possible, the shoulder

blades possessing great length, well laid back at the withers, all of which combine to give lightness of forehand and roominess in front of the saddle and ensure easy action in all places. The shoulders in a typical harness horse, on the other hand, are more or less heavy, as compared with the hack, and less sloping. They are broader, affording plenty of space to bear against the collar, thus naturally tending to make them heavy from a riding point of view. Although sloping shoulder-blades are desirable in both types, the fact of being comparatively upright may be condoned in the harness type, and does not constitute nearly so serious a defect as in the riding horse, their principal drawback involving poor action. A horse with a straight shoulder can neither canter, gallop, nor jump well, and in the riding horse results in the saddle being carried too far forward.

Then in the breast the two types differ much. In the harness type it is broader than in the riding type. Broadness of chest adds much to a horse's power of draught. Breadth of chest naturally involves a greater width between the forelegs than is desirable in the hackneys. Horses which are comparatively wide between the forelegs roll more or less while in action. That defect, serious in the saddle, is no drawback in harness. And it is necessary that the harness horse should be somewhat heavy in front to throw plenty of weight into the collar. In the riding horse the forehand must necessarily be light. Any tendency to heaviness in front constitutes a very grave defect in a horse used for saddle purposes. And, lastly, the neck. In this the saddle and the harness types differ considerably. In the latter the neck is broad and comparatively short and thick, and from a riding point of view is too heavy. In the saddle horse type the neck is lengthy and lighter, and more supple in shape. It is essential that the saddle horse should possess a lengthy neck, and that it may bend properly to the rein. Taking the forehand as a whole, that part is comparatively heavy in the harness horse type, the heaviness being due partly to the neck and shoulders, and partly to the broad chest.

Vegetable Ash as a Manure.

Mr. W. Guerrero, in a recent issue of the *Chemical Trade Journal*, calls attention to the beneficial effect of applications of ashes both as a direct source of plant food and as a means of rendering other fertilising materials more available. The extensive use of ashes on the Continent of Europe is illustrated by the fact that 22,000 to 24,000 tons of ashes are used annually in the olive industry alone.

Disc-Harrowing Lucerne.

Mr. R. H. Forbes, in Bulletin No. 57 of the Arizona Agricultural Experiment Station, enumerates the principal benefits of disking lucerne as splitting and spreading the crowns, thereby causing new growth, destroying the egg deposits and larvæ of injurious insects, destroying weeds, and breaking up dense soils, and especially the silt-blanket deposited by muddy irrigation water. It is estimated that disking will increase the average crop in Arizona 10 to 20 per cent.

Observations were made on the reduction of the yield resulting from the silt-blankets, which are often 3 to 4 inches thick. A field near Yuma showed a depreciation of 6.3 per cent. in the second cutting, one near Phoenix of 9.7 per cent. in the third cutting, and one near Solomonville of 27.6 per cent. in the second cutting.

Composition of Fresh Avocado Fruit.

According to the analytical data presented by Mr. E. A. Patrault, in the *Bulletin Assoc. Chim. Sucr. et Distill.*, the edible portion of the avocado has the following percentage composition: Water 82.1, protein 1.2, fat 8.7, sugar 2.9, cellulose and undetermined material 4.6, and ash 0.5 per cent. Starch and tannin were not present. The fat, it is stated, is a green aromatic oil with an odour recalling that of laurel oil, which solidifies at 15 per cent. C. The sugar present was not completely identified. It reduced Schling's solution, and hence is not the same as that which has been identified in the avocado seed.

Fertility in Scottish Sheep.

A series of statistics, based upon inquiries made by sheep-breeders, was compiled by Mr. F. H. A. Marshall, in a recent issue of *Trans. Highland and Agr. Soc., Scotland*, for the purpose of showing some of the principles involved in determining fertility in sheep. The percentage of lambs per 100 ewes and the percentage of barren ewes in various flocks of different breeds and kept under different conditions are shown in tabular form. It was found that certain changes of weather during the breeding season may have an unfavourable effect upon the percentage of lambs, and that the practice of flushing ewes almost invariably has the effect of increasing the percentage of twin lambs and triplets. Considerable evidence was obtained to show that a high fertility is ordinarily hereditary.

Supplements to Maize for Fattening Hogs.

Bulletin No. 126 of the Indiana Agricultural Experiment Station contains the results of a comparison, by Messrs. J. H. Skinner and W.

H. Cochel, of tankage, linseed meal, and soy-bean meal as supplements to mealie meal for fattening hogs. The tests were conducted at different seasons of the year with hogs of various ages and conditions of finish. The results are shown in the following table:—

COMPARISON OF TANKAGE, LINSEED MEAL, AND SOY BEANS AS SUPPLEMENTS TO MEALIES FOR FATTENING HOGS.

		Ratio of supplementary ration to basal ration. (mealie meal). •	Number of days fed.	Number of Pigs.	Daily gain per head.	Amount of feed per pound gain.	Cost per pound gain.
Experiment 1 :					lbs.	lbs.	Pence.
Period 1—							
Lot 1	...	Tankage 1 : 10	35	8	1'57	3'58	1'84
Lot 2	...	Linseed meal 2 : 10	35	8	1'48	3'82	1'94
Period 2—							
Lot 1	...	Tankage 1 : 10	48	8	1'60	4'33	2'17
Lot 2	...	Linseed meal 2 : 10	48	8	1'36	4'68	2'34
Experiment 2 :							
Period 1—							
Lot 1	...	Tankage 1 : 36	30	9	1'65	3'76	1'81
Lot 2	...	Linseed meal 1 : 8	30	10	1'42	3'86	1'88
Period 2—							
Lot 1	...	Tankage 1 : 32	21	9	1'12	4'00	1'86
Lot 2	...	Linseed meal 1 : 16	21	10	1'20	3'79	1'77
Experiment 3 :							
Lot 1	...	Tankage 1 : 20	29	7	1'53	3'75	1'88
Lot 2	...	Linseed meal 1 : 10	29	7	1'38	4'22	2'01
Experiment 4 :							
Lot 1	...	Tankage 1 : 15	60	5	1'83	3'83	1'85
Lot 2	...	Linseed meal 1 : 8	60	5	1'75	3'75	1'81
Experiment 5 :							
Lot 1	...	Linseed meal 1 : 5	39	4	1'23	3'82	1'91
Lot 2	...	Soy-bean meal 1 : 5	39	4	1'33	3'46	1'73
Experiment 6 :							
Lot 1	...	Linseed meal 1 : 8	60	5	1'75	3'75	1'81
Lot 2	...	Soy-bean meal 1 : 7	60	5	1'82	3'68	1'79
Summary of Experi- ments 1, 2, 3 and 4		Tankage ... Linseed ...	...	...	1'61 1'49	...	1'91 1'98
Summary of Experi- ments 5 and 6		Linseed meal ... Soy-bean meal ...	...	...	1'48 1'56	3'78 3'60	1'85 1'77

In the first period of the first experiment 5 parts of middlings were added to the ration. It is concluded that the tests with soy-bean meal indicate that it is possible to grow in Indiana a feed which is equal in value to linseed meal as a supplement to maize for fattening growing hogs in a dry lot. Mealies should be the basis of all rations for fattening hogs, but a larger proportion may be used with tankage than when linseed meal is used as a supplement. With tankage the hogs consumed more feed, made a more rapid gain, and were better finished than when linseed meal was used. Soy-bean meal proved to be a more efficient supplement than linseed meal both as regards the rate and cost of grain.

Among the Farmers.

THE ASSOCIATIONS DURING THE MONTH.

* * *The attention of secretaries of agricultural societies and similar bodies is drawn to this section of the Journal, which has for its object the publication of reports of farmers' meetings, annual reports, presidential addresses, etc.; and it is hoped that full use will be made of the facilities here offered for the dissemination of news regarding such doings of the many associations all over the Colony as are likely to prove of general interest to readers of the Journal. In forwarding copies of presidents' reports, etc., correspondents are respectfully requested to make sure that they give the date of the meeting on the occasion of which the address was delivered or report read.*

BOSTON.

The Chairman of the Boston Farmers' Association (Mr. Thos. Fleming, J.P.), read the following report on the occasion of the annual meeting of the Association:—

"Gentlemen,—I now present the 19th Annual Report.

"During the past year it has not been found necessary to meet often, as the holding of stock sales has been discontinued in the meantime. I regret that it has not been found possible to have had a sale of stock (other than cattle) and produce, and I again throw out the suggestion for your consideration.

THE PAST SEASON.

"On the whole we have had a good season, and stock of all kinds has done well. The mealie area continues to increase, but the rains were too heavy, and too late, to ensure heavy crops. The native, as usual, has not enough to meet his own requirements. If the phosphate discoveries prove really good, and if the fertiliser can be procured at about half the cost of the imported article, then mealie-growing will pay quite well in many places where they cannot now be grown profitably, but we cannot compete with other parts of the Colony more adapted for the growth of this cereal. Potatoes have been more extensively grown, but the crop has proved light, from blight and excessive rains. Turnips and swedes have been a great success. Fruit has also done well.

"Jackals have played havoc among some flocks, and I regret to say that they are still in the district. As you are aware, the Government

discontinued granting rewards for skins, but I hope some concerted plan will be adopted for the eradication of this pest.

"Two public meetings were held under the auspices of the Association. These were for the purpose of hearing our members and others discuss the question of Closer Union.

"Your delegates attended the Annual Conference of the Natal Agricultural Union, and voted according to your instructions. Many resolutions not on the published agenda were, however, discussed. A number of these were of far more importance than many considered by the Associations, and some bar should be placed on the wholesale introduction of fresh resolutions.

ROADS.

"Those of us who live within easy distance of Elandskop Station have little, or shortly will have little, to complain of with regard to roads in *fine* weather, but many farmers suffer great hardship from the want of decent roads to some stations, and in the more outlying portions of Impendhle Division. We, however, require roads that we can use all the year round, especially now that the work must be done by horses, mules, and donkeys, none of which can touch the ox for patient and plodding endurance on roads deep with mud. It is quite useless for us to expect Government to construct a branch line to Impendhle at the present time, but we should never cease urging that a good, hard road be made into the heart of our Division. This could be used for traction, mule transport, and carriages, and would, in my opinion, serve the purposes of the Division much better than a narrow gauge railway. The railway stations should all have hardened roads to them. A great impetus would thus be given to the raising of produce for market, and the railways would pay better.

EAST COAST FEVER.

"I now come to this plague, which is undoubtedly the reason why Natal is not more speedily recovering from the painful period of depression. I am thankful to say that Impendhle Division has, so far, been spared this visitation, but the question is, "Is it possible for it to continue a clean area?" I am very hopeful, but we must fight, and to do that, money is needed. The Board in this portion of the Division has conducted everything with the greatest economy, but the time has come when more must be done by every farmer, both in the way of supplying the sinews of war, and in carrying out, and in seeing that others carry out, East Coast Fever Regulations. I regret that in some cases, while the letter of the law is respected, the spirit is not regarded. Gentlemen, I cannot too strongly urge upon you to put up with inconvenience and losses for the general good of the community. Depend

upon it, you will not lose in the long run. The disease is very near our borders, in Umgeni and Lion's River Divisions, and it is bound to come closer, at anyrate in the Zwaartkop Location.

"Movement of cattle throughout the Colony has now been stopped, and wisely so, but, to prevent straying, fencing is absolutely indispensable. Let me again urge all owners of cattle to take up the next weapon, and destroy the tick. Dipping is almost entirely neglected here, although it is unquestionable that by reducing the number of ticks, risk of the disease spreading is also reduced.

"Since we last met this Colony has decided to throw in its lot with the other Colonies. This decision has cleared the atmosphere, and already there are signs of returning prosperity—the tide is turning and the outlook is brighter. However much we have differed in the past on the question of Closer Union, we should all work together to make it a success. A favourable impression has been created in Great Britain, and purse strings will be loosened and investments made in South Africa. We hope that not only will money flow in, but that it will be brought by men who will make their homes here, for the cry of the country is a larger white population to develop and defend 'South Africa.'

"The thanks of the Association are due to Mr. Fly, the Hon. Secretary, and to Mr. Phipson, the Hon. Treasurer, for their valued assistance."

The following office-bearers for the ensuing year were elected:—Chairman: T. Fleming, J.P.; Vice-Chairman: T. W. Rudland; Hon. Secretary and Treasurer: W. J. Fly.

CAMPERDOWN.

The Camperdown Farmers' Association held their annual meeting on Friday, 6th August, in the Agricultural Hall, Camperdown. Mr. C. J. A. Scheepers presided; and there was a comparatively small attendance.

The following letter, addressed to the Secretary by Mr. H. A. Hime, Under Secretary for Agriculture, and dated 26th June, was read:—

"Sir,—With reference to your letter of the 8th ult., forwarding a resolution passed by your Association, asking that ten-ton trucks should be placed at the disposal of farmers for the conveyance of mealies intended for export, I have the honour to inform you that this matter has been fully considered, but that it is found that the rolling-stock at the disposal of the railway management makes it impossible to meet the suggestion to convey export maize in ten-ton loads."

The Secretary and Treasurer, Mr. J. Baker, presented a statement of the financial position of the Association, according to which there

was a credit balance of £6 0s. 9½d. for the year, as compared with £4 17s. 6d. for the previous year.

The President then addressed the meeting as follows:—

“At our last annual meeting Mr. H. Baker was elected President, but he resigned before the first quarter was out, and at the first quarterly meeting I was done the honour of being elected President, which office I have tried to fulfil with honour, knowing all the time my great shortcomings. I have been very glad to be so well supported by all. Mr. J. Moon and myself attended the Annual Conference in Maritzburg last April, of which Mr. Moon kindly gave a report at our May meeting. At our special meeting we considered tenders for fertilisers and grain bags, and we accepted tenders from T. Burman for the fertilisers, which have not been delivered yet. Of grain bags we also accepted tenders from T. Burman, but I am sorry to say the same have not given satisfaction all round. We had a public meeting the same day as the special, and the former was well attended. Mr. Hyslop, M.L.A., addressed the meeting on behalf of Closer Union, after whom Mr. H. Fell, M.L.A., also said a few words. I have been well pleased to note the good attendance at nearly all of our meetings, although I think we ought to be able to get a lot more new members, as our Association is small for such a place as Camperdown Division, with its large population. I now wish to express my hearty thanks to our Hon. Secretary, who has done his duty well, and has always been very obliging to everyone, and never thought it too much trouble to try and please all. I also thank all the members for all the support I had, and hope that you will all give my successor the same support with the same goodwill.”

The meeting then terminated.

KLIP RIVER.

The Klip River Agricultural Society held their annual meeting at Ladysmith on the 14th August. The President of the Society (Mr. D. R. Bester) took the chair; and among those present were Messrs. G. Pinkney, W. Freer, H. Nicholson, J. G. Bester, Herman Illing, J. Farquhar, C.M.G., M.L.A., J. Newton, J. de Waal, H. C. Thornhill, R. Horsley, D. Sparks, T. Russell, E. Sparks. T. Russell (managing director of the Mooi River Creamery), and W. J. Teasdale (Secretary of the Society).

The President asked Mr. T. Russell to address the meeting.*

Mr. Russell said he had attended in response to a request from the Secretary. He understood that the request was in connection with the

* We are indebted to the *Times of Natal* for the following notes of Mr. Russell's speech and the remarks of the speakers following him.—ED.

establishment of a creamery in Ladysmith. The fact that the Mooi River Creamery was in existence might to some extent qualify his words. But he could assure all present that he would do his best to see a creamery started in Ladysmith. He would say that some two years ago he moved in the matter of adding to the Mooi River Creamery. That would mean an expenditure of £3,000, but in view of Tick Fever the scheme was abandoned. In view of East Coast Fever he would not advise the starting of a creamery in Ladysmith. At present the two creameries could handle all the milk they could obtain. They would understand that they would come into competition with Nel's Rust and Mooi River Creameries. It was the farmers that would have to put money into the creamery, if started. If a creamery were started it must be on co-operative principles. He was willing at any time to assist the Ladysmith farmers. With regard to the Mooi River Creamery they were able and willing to take all the cream that could be supplied. They were taking cream from the Transvaal. They paid railage at the station, and that practically made the Mooi River Creamery a Ladysmith creamery. In the summer they paid an average price of 1s., and in the winter an average of 1s. 3d. He was glad to say that the local creameries were gradually overtaking the imported article, and but for East Coast Fever they would have been exporting butter. But they could not export at 1s. per lb., for New Zealand butter was landed at 10½d. per lb., to which 2d. was added for duty. They gave a high price for butter, and if dairying was not a paying proposition, then they had not got the right stock. They had some really good cows, and what they should strive to do was to work up to the good average. That could only be done by testing the milk. There was money in dairying, and the creamery took the burden of work off the farmers' hands.

DETAILS OF WORK.

Mr. Russell at this stage stated that under the process carried out at the Mooi River Creamery, and also the testing process, farmers could use both as a check against the factory, and a list of their cows. He laid great stress on the matter of cream cans. As far as they were concerned the factory returned cans daily. The N.G.R. carried milk, cream and cans at owners' risk. Though a co-operative concern they were not as strong as other concerns in the Colony, but they hoped to pay out for supplies on the 15th of each month. At present they paid out on the 21st of every month. They supplied separators at Pietermaritzburg prices, and allowed the cost to cover six months. They allowed each supplier to supply his own separator. He preferred the Alfa-Laval separator. It required more cleaning, but it took out more butter-fat than any other separator. The Globe was a good machine

also. But this was a matter of opinion, and, as with the plough, it was largely a question of the person at the back of the machine. He was glad to have the opportunity of addressing the meeting. He claimed that if farmers backed up co-operation and co-operative concerns, it was absolutely in the farmers' interests. They had people in the Colony who had put money into the concern for the good of the Colony. If they in Ladysmith could not get satisfaction from the existing creameries then they might start a creamery. They could get shares to-day in the creameries in Natal on favourable terms. They had asked the Government to assist them on co-operative lines, and that would have been for the benefit of the Colony. The Government did not help them. Competition in the way of starting new dairies meant a cut-throat policy. What was wanted was co-operation.

The President thanked Mr. Russell, and said that what was required in Klip River district was to get in cream from the outlying districts.

Mr. Farquhar said the idea was to find out if the Mooi River Creamery would not start a collecting station in Ladysmith. There would be railway works going on and a good demand. Until there was a collecting station locally, the small farmer would not trouble himself. He thanked Mr. Russell for what he had said.

Mr. J. G. Bester said that there were large farmers in the district who did not support the creamery. It would be to the advantage of the Mooi River Creamery to collect in the Klip River district.

Mr. Russell said the point was worthy of consideration. He had returned from a visit to Cundycleugh and Normandien, and had successful meetings. The creamery was running a cart from Newcastle to the Berg, and from Dannhauser to Cundycleugh. Farmers must help themselves. The Deity himself would not help those who would not help themselves. He suggested the formation of a local committee to consider the subject. A centre in Ladysmith would mean expense. The cream had better be sent direct to the Central Factory. It was only to-day the farmer was awakening to the benefit of creameries. He was prepared to assist the farmers in the running of cream-vans.

Mr. Farquhar suggested the advisability of calling another meeting, when Mr. Russell could again address the farmers. He proposed a resolution to that effect, and that the meeting be a public one on the first Saturday in September. Mr. H. Illing seconded.

Mr. J. G. Bester said September was the lambing season. October was a better month. It was decided to call a meeting on the first Saturday in October.

On the motion of Mr. Farquhar, a hearty vote of thanks was accorded Mr. Russell for attending the meeting.

TREE-PLANTING COMPETITION.

Mr. A. W. Smallie (Dundee), who was present, introduced the subject of tree-planting in connection with the Natal Agricultural Union. The speaker said that Mr. Maurice Evans, of Durban, introduced a tree-planting competition years ago, but it fell through. In connection with the present scheme he (the speaker) represented Dundee and district. Mr. Smallie referred to the utility of tree-planting in Natal, and to the fact that more forests in Natal would improve the Colony. The Government were not in a position to take up afforestation to any large extent, but in the Cape this had been done by the Government. The timber supply of the world was diminishing rapidly, and the only country in the world that had neglected the matter till lately was Great Britain herself. The idea of the Agricultural Union was to get farmers to compete for prizes, and afford object lessons in tree-planting to others. The Colony would be divided into three areas. The area for competition must not be less than five acres, but five varieties of trees could be planted. The judging of trees would take place in 1915. The trees must have commercial value. Hard-wood trees were required for railway sleepers, and Mr. T. R. Sims' book on tree-planting could be obtained as a guide. It was a book of educational value. Trees could be obtained from Cedara at one penny each (excellent trees), and the total cost of planting five acres would be £14 3s. 9d., plus railage. Seeds could also be obtained for planting. He hoped that farmers in every centre in Natal would take up the competition. It was a splendid investment for future generations.

The President thanked Mr. Smallie, and hoped that competitions would be entered into upon in the Klip River district.

On the motion of Mr. Illing, it was decided that the hon. secretary should endeavour to get subscriptions and entrants for the competition, the secretary expressing his willingness to do his level best.

A hearty vote of thanks was accorded Mr. Smallie for his address, on the motion of Mr. H. Illing.

PRESIDENT'S REPORT.

The Secretary having read the minutes of the last annual general meeting, the President presented the following report:—

Gentlemen,—I have again the honour to address you from the presidential chair.

It is not long since you had a report from me: therefore, I do not intend to give you a long one this time, as in my last I dealt fully on each agricultural subject.

CEREALS.

At the outset, I am inclined to deal with general conditions in respect to cereals, which, I am glad to say, have had a fair season, although not quite so successful as was expected, and this is due to the over-abundant rains we have had in this district during the year.

The price of mealies, at an average of about 8s. 6d. per bag, although not as high as we should wish, still is good enough to grow for, and now that we have the oversea markets, we cannot grow too extensively. Forage, too, was good, and there is an abundance even now.

STOCK.

Cattle have done fairly well, with the exception of the ravages of East Coast Fever, which disease, gentlemen, I am sorry to say, is still in our midst, and, although not spreading as fast as in some of the other centres of Natal, still is slowly making a headway, and keeping down prices of cattle.

Horsesickness has been of a serious nature, and there is still room for our Government experts to pronounce a cure for this disease, as well as for some of the other stock diseases.

Goats have done very badly, and have died in great numbers, the cause of which, I think, is wireworm, carried by the abundant rains.

Sheep also have not done well, but are recovering now that we have the new grass, and I hope to hear of a good lambing season.

DAIRY INDUSTRY.

Dairy work is, unfortunately, in a very undeveloped condition, but I presume that the presence of East Coast Fever has interfered with it to a great extent, and, gentlemen, I think there is plenty of room for improvement in the class of bull kept amongst our cattle. As an incentive, we have invited Mr. T. Russell, managing director of the Mooi River Creamery, to attend here to-day, and, I hope, with good results.

ATTENDANCE AT MEETINGS.

Now that we are about to enter into another new year of the Society, I would urge all members to be punctual at the meetings, and not keep your President and Secretary gathering you to attend a meeting, as hitherto. The same applies to paying your subscriptions. Our Secretary will enter into other details later regarding subscriptions.

In conclusion, I convey the Society's sincere thanks to the honorary officers and others who aided us by their advice, financial assistance, and influence during the year.

I have now to take my leave as President, thanking you for your patient attention and your assistance in my duties.

FINANCES.

The Secretary, in his report, showed that there was an overdraft at the Natal Bank of over £100, and several accounts to meet, including local rates.

Mr. Farquhar proposed that a committee of three be appointed to get in arrear subscriptions, to report in October.

Mr. D. Sparks said that the Society could only be kept alive by holding an annual show.

Messrs. J. Farquhar, H. Nicholson, and J. Bester were appointed as the committee.

ELECTION OF OFFICERS.

The following officers were elected:—President, Mr. J. G. Bester; Vice-Presidents, Messrs. Dan Bester, D. Sparks, and H. Nicholson; Committee, the retiring committee was elected, with the addition of Messrs. W. W. Jones and D. E. Henry; Secretary and Treasurer, Mr. W. J. Teasdale; Auditor, Mr. J. T. Francis.

Messrs. J. G. Bester and J. De Waal were appointed as delegates to the Agricultural Union, with Messrs. D. R. Bester and D. Sparks as alternatives.

On the proposition of Mr. Farquhar, it was decided that the Society pay the expenses of the delegates.

The latest Imperial Institute Report on Fibres to hand (Colonial Reports—Miscellaneous—No. 58 [Cd. 4588]) contains an interesting note on a sample of *Furcroea gigantea* from Natal, which was received at the Imperial Institute for examination. The sample was labelled "Aloe fibre—Natal," and consisted of rather lustrous white fibre, which had been fairly well cleaned and prepared. It was of rather uneven strength. The length of staple was 4 feet. Chemical examination of the fibre gave the following results:—Moisture, 9.3 per cent.; ash, 0.9 per cent.; *a*-hydrolysis (loss), 12.7 per cent.; *b*-hydrolysis (loss), 14.7 per cent.; acid purification (loss), 1.7 per cent.; cellulose, 75.5 per cent. The sample was submitted for commercial valuation to experts, who described it as corresponding fairly well with "good fair quality" Mauritius hemp, and valued it at £26 10s. to £27 10s. per ton. At the time of this valuation Mauritius hemp was quoted in the London market at £25 to £30 per ton.

Correspondence.

POTATO SORTER.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—It may interest you to know that we are agents for the potato sorter described on pages 11 and 12 July number *N.A. Journal*, and that we have a stock of these implements in Durban.

This sorter, which was exhibited by us at the last Durban Show, does good work, and can be seen and tested at work at our store, 235A, Pine Street, Durban, at any time.—Yours, etc.,

EDWARD E. DOWNING,

Manager, Rosetta Co-operative Association, Ltd.

Rosetta.

FIREBREAKS.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Can you inform me what would make the best fire belt? I mean, can one grow plants, shrubs or trees that will have a reliable effect in stopping a grass fire?

Of course, I am aware that a burnt strip is the best protection, but I would like to know if there is a natural living one available.—Yours, etc.,

Reitz, O.R.C.

R. LEIGH.

[Wild sage, prickly pear, Mauritius thorn, wattle and beefwood are all satisfactorily employed for this purpose, though the usual method is, of course, to burn grass breaks around the area to be protected. Any tree or plant of non-inflammable character which by the nature of its growth kills out grass growing under trees will serve the purpose of a firebreak.]

WENSLEYDALE SHEEP.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Having taken an interest in the introduction of the better production of wool in Natal, and knowing the holder of the champion prizes for long-woolled sheep, he writes by this mail to inform me that, having taken an interest in the study of wool and exhibited fleeces at

the Royal Show for five years past, we hold two first prizes and three seconds from Wensleydale sheep.

The Wensleydale produces the finest quality of mutton of any long-woolled British breed, and their wool is the finest long staple lustre wool produced in the British Isles. It perhaps more approaches mohair than any other breed of sheep, and the wool from yearling hogs or yearling sheep is largely used for mixing with mohair for the production of bright dress fabrics, braids, etc. He is exporting rams for South America and feels sure they would, crossed with South African sheep, increase the weight of wool without deteriorating the quality. Those who have farmed in the north of Yorkshire know that Wensleydale sheep are strong constitutioned and very active, and will serve more ewes than the sluggish Lincoln or Leicester. The weight of the washed fleece is 13 lbs., and of the whole flock 10 lbs., and finds a higher price than the other long-woolled sheep. If the breeders of this country can, by the introduction of long-woolled Wensleydale rams, add considerably to the weight of their fleeces and introduce by the crossing more hardiness in the flocks, such an introduction will benefit the Colony at large. The sample of wool I enclose is from a yearling ram and is one foot in length.—Yours, etc.,

ARTHUR DIXON, F.G.S., etc.

In founding a dairy herd, the cows should be selected with the greatest care and approximate as near a uniform type as possible. The successful breeder is one who understands the fundamental principles of animal improvement and who possesses the patience and ability to apply them in animal industry.

We have received from Messrs. Malcomess & Co., Ltd., the well-known machinery merchants of Durban and East London, a copy of a descriptive catalogue which they have prepared dealing with the most advanced machinery now on the market for the cultivation of the maize crop. The catalogue contains descriptions and prices of the most approved implements for use in connection with the maize crop, including ploughs, cultivators, shellers, etc., and will be found useful by farmers in selecting machinery for next season or to take the place of antiquated implements. Messrs. Malcomess & Co. will be pleased to send a copy to any farmer who wishes to obtain one.

THE FARMER BOYS' PAGES.

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Conducted by "ARATOR."

* * *Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.o. Editor, "Natal Agricultural Journal," Maritzburg.*

"Arator" to His Friends.

FROM this issue, henceforward, the FARMER BOYS' PAGES are to appear monthly in the *Agricultural Journal*; and in this, the first issue, I want to extend to all who are studying—whether practically, theoretically, or both ways combined—to become farmers, or to improve their knowledge of the science of farming, a cordial invitation to make free use of these PAGES for inquiries, interchange of ideas and experiences, comments, and so forth. If you have any trouble, if there is any particular point in the articles appearing in these PAGES about which you are not clear, or if you want anything explained, write to me, and if your inquiry is of sufficient general interest I will publish a reply in these PAGES, if not I will reply to you by letter.

* * *

These PAGES are not for school-boys only: they are for all, whether on the land or not, who are studying, who are observant, who want to know more about farming and what it means, who want to understand the *principles* of farming, or who want to pick up hints that will help them. Whether you are in town or in the country, you can learn a lot by reading, observation, and thinking; a tiny plot of ground will raise up for you a few mealies, or a bunch of barley or oats, or any other agricultural plants you like, and you can study them, watch them unfold, learn how the grain or other fruit forms, observe the result of a

handful or two of fertiliser on one lot as compared with another lot that has not been manured; you can watch for insects and learn their habits and (from the FARMER BOYS' PAGES later on) how to destroy them by means of sprays and washes; you can study the soil: in short, a little plot of ground in a back garden will enable you to learn a great deal if you read and are observant. A large plot will enable you to learn the importance of tillage, how to plant, and so on. A fruit tree or two and a grape-vine will give you an opportunity of learning something about fruit culture, such as, in particular, pruning, manuring, and treatment of insect pests. The keeping of a few fowls will give you further opportunities of combining theory with practice; whilst if you live on the farm, the farm animals will even be a source of interest to you.

* * *

Be satisfied with little beginnings; from them you can gradually add to your store of knowledge by reading and by continued observation; and I hope in these PAGES to give you plenty to read and think about as the months go by. All the articles will be written in a clear style, and will not be too technical. The young farmer wants to learn quickly; and consequently I am going to make the matter I publish as varied as possible. This month you have the first articles of three series: one on Soils, another on Agricultural Chemistry, and a third on Implements of the Farm; whilst you will find a variety of short notes, paragraphs, etc., of varied interest.

* * *

Remember to write to me whenever you want anything explained. Address your letters to "ARATOR," care of Editor, *Natal Agricultural Journal*, Maritzburg.

Implements of the Farm.

I.—THE PLOUGH.

THE plough is perhaps one of the oldest implements used in the tillage of the soil known to us. In various forms it dates far back into antiquity.

Whilst its purpose—to break up the soil—is still the same, it has undergone many modifications, until now we have, instead of an implement that merely *scratches* the surface soil, an instrument for actually turning the soil over, laying bare the under portions and burying the original surface. The modern plough, for so turning over the soil,

was invented in the Netherlands in the seventeenth century; it has, however, undergone much improvement since then.

There are many kinds of ploughs in use; among the chief may be mentioned wheel ploughs, swing ploughs, double-furrow ploughs, multiple furrow ploughs, gang ploughs, subsoil ploughs, one-way ploughs, ridging ploughs, paring ploughs, potato ploughs, steam ploughs, and draining ploughs.

Whatever the construction of a plough may be, it consists of some or all of the following principal parts, *viz.*: The cutting parts—the *share* and the *coulter*; the turning part—the *breast* or *mouldboard*; the *frame* or *skife*, to which the share and mouldboard are fixed, the whole forming the *body* of the plough; the *beam* and *handles*; the *bridle* or *head*; and the *wheel* or wheels, for regulating the width and depth of the ploughing. We will discuss each of these parts in turn.

The Share.—The share is the part of the plough which cuts the earth horizontally. It is fixed to a projecting portion of the lower part of the body of the plough, termed the *sole*. There are various forms of shares, adapted to different kinds of work, *e.g.*, square work, crested work, stony land, deep work, wide work, paring, setting out, ridging, subsoiling and so on. They are now invariably made of cast iron, chilled. These chilled shares have the advantage over the old wrought iron and other shares in that, whilst the upper part of the share is soft and tenacious, the under surface is as hard as steel. As a result, the upper part tends to wear away and the cutting edge always remains sharp; whereas the older shares had to be periodically relaid owing to their wearing blunt. Another point in their favour is that they require less draught.

The Coulter.—This is a large, strong knife, fixed at its upper end to the body of the plough, just over the share. It is designed to make a vertical cut through the soil as the plough moves forward. The coulter can be moved and so set to meet requirements. It is not usually set perpendicular, but at an angle, which varies with the nature of the land: the stiffer the land the greater the angle. A *skim coulter* is sometimes used in addition to the ordinary coulter. It is smaller, and is fixed to the beam immediately in front of the ordinary coulter. Its purpose is to pare off and turn into the furrow when ploughing lea and stubble, the herbage on the top of the furrow slice, in order that no vegetable matter may be left untouched but all completely buried.

The Mouldboard.—The cutting of the slice of earth, horizontally by the share and vertically by the coulter, is only the preliminary operation of the plough: the ploughing proper—that is, the turning over of the slice of earth so as to bury the surface and expose the under portion—is done by the mouldboard, the bright curved plate of cast iron immediately behind the coulter and over the share. This mouldboard

receives the earth as it is cut by the coulter and share and throws it over to the right, in a continuous strip. The important point about the mouldboard is, of course, its shape, for the angle at which it leaves the turned slice of earth depends upon the curve of the rear portion of the mouldboard, whilst if it is wished that the furrow-slice should lie unbroken the mouldboard must be of some length. Both long and short mouldboards may be seen in ploughs. Some farmers prefer a long mouldboard because it leaves the furrow-slice unbroken, whilst others prefer a short one because, by breaking up the furrow-slice, it helps to pulverise the ground. Under the old style of ploughing, the object was to get the furrow-slices to lie in even, definite lines, as unbroken as possible, and broken furrow-slices were taken as indications of bad ploughing. The modern idea, however, since the advent of the American chilled-steel "digging" breasts on ploughs, is to lessen the subsequent work of the harrow and cultivator by crushing the earth upon itself so as to break it up thoroughly. The better a plough breaks up the earth, nowadays, the better most farmers like it. A short mouldboard assists in this pulverising process, and for that reason it is, as a rule, preferable to a long one. In connection with the question of the length of the mouldboard, there are one or two points which should be borne in mind, *viz.*: A heavy clay soil is apt to clog a short mouldboard, on account of the greater hollow such a mouldboard contains as compared with a long one, and there will be more of a load for the animals to pull; on the other hand, a short mouldboard is preferable for sandy soils, because such soil will work freely off the mouldboard, leaving it brighter, and there will be less friction, and so less draught will be required. The more clay a soil contains, the longer the mouldboard should be, as a general rule.

The Frame of the plough is the central portion of the implement to which are fixed the mouldboard, beam, handles, etc.

The Beam is a strong iron bar or wooden beam, one end of which is fixed to the frame. The animals are yoked to the beam; and the coulter is fixed to it.

The Handles are fixed to the frame, and are held by the ploughman, who thereby keeps control over the implement, directing its course and keeping the depth of the furrow uniform.

The Bridle or Ploughhead is a contrivance at the outer end of the beam to which the animals are yoked; and it is so constructed as to permit of the line of draught being readily adjusted. The draught shackle can be moved upwards or downwards or sideways to the right or left, as required.

Next month we will consider the working of the plough, the kinds of furrows it turns, subsoiling, etc.

Agricultural Chemistry for Beginners.

By ARCHIBALD PEARCE.

CHAPTER I.

To a layman chemistry is as bad as Greek; and yet, like most other things, its difficulties vanish when it is understood. It is no very serious task to grasp so much of the elements of the subject as will enable one to take an intelligent interest in such semi-technical writings as ordinarily appear in agricultural literature, and I propose to write a series of short articles on the subject of Agricultural Chemistry, with the hope of affording some assistance to those who regret the absence of a scientific education. It will, throughout, be my aim to write plainly and avoid technicalities as much as possible; to limit the articles chiefly to that branch of the subject which is concerned with fertilisers and soils; and to introduce only so much theory as is necessary for clear explanation. In two matters I must beg the reader's indulgence; first, that he should follow the series from the beginning, as the various chemical terms used will be explained as they occur, and not a second time; and, secondly, for my own deficiencies, of which I am only too well aware. There is so much to be said that a choice becomes difficult, and my choice may not always be the best; but I shall use my best discretion.

In treating a new subject of whatever kind it is usual to carefully define some of the new terms to be used. To commence with, chemistry is essentially the study of Elements and their Compounds.

ELEMENTS.

An element is a substance which no one has yet succeeded in breaking up into two or more simpler substances, or, in other words, which is composed of one kind of matter only. It is not impossible that some things now called elements may be eventually so divided, but until this happens they are considered to be indivisible substances. Elements are, so to speak, the bricks of which all other known substances are built up. There are between 70 and 80 known, some of them quite rare; those that will chiefly concern us are:—Oxygen, Hydrogen, Nitrogen, Chlorine, Carbon, Phosphorus, Sulphur, Silicon, Calcium, Iron, Aluminium, Potassium, Sodium and Magnesium. The last six are metals, the rest non-metals. All other substances are formed by the combination of various elements in various proportions, and substances of this kind are known as compounds.

COMPOUNDS.

It is essential to grasp the chemical meaning of this word; the elements which form a compound are so united together, and held in combination by a force called chemical attraction or affinity, that they cannot be separated by merely mechanical means. A simple experiment will make this clearer. If we take a little powdered sulphur, and grind it up with about twice its weight of iron filings, we shall see the particles of iron and sulphur lying side by side, and could wash away all the sulphur from the iron, or separate the iron by plunging a magnet into the mass, to which the filings will cling. Here we have a mere mixture, and no compound is formed. But if we now heat the mixture rather strongly a sort of glow will spread through the mass; a black substance will be formed in which no particles of either iron or sulphur will be visible, and upon which a magnet has no effect. Combination has taken place under the influence of heat; a compound of iron and sulphur, called iron sulphide, has been formed, entirely different in its properties from both iron and sulphur. Mixtures differ from compounds in another important particular; one can mix substances together in any proportion one pleases, but compounds always consist of the same elements united in the same proportions. For instance, in our experiment above, if we used exactly the proper proportions, *viz.*, 32 parts by weight of sulphur to 56 of iron, there would be no iron or sulphur left as such, but 88 parts of iron sulphide instead. If, however, we had taken, say, 60 parts of iron, there would still be only 88 parts of iron sulphide formed, the other 4 parts of iron remaining unaltered. It is this law of constant composition that enables the analyst to state definitely the quantities of various elements contained in their compounds.

NO DESTRUCTION.

Another important principle is that all matter is incapable of being destroyed. We can change its form, or make it disappear from view, but it still exists in some form or other, and by suitable means can be completely accounted for. When a candle burns, it disappears; it vanishes entirely, and in common language it has been destroyed. But this is not true in reality; the constituents of the candle have been undergoing combination with a part of the air, and the products formed are in the form of gases and invisible, which by proper means can be absorbed and weighed, and are found to actually weigh more than the original candle, the increase being due to that part of the air which has helped to form the new products.

(To be continued.)

A Chat about the Soil.

I.—HOW IT IS FORMED.

THE soil is by far the most important part of the farm: it is, in fact, the basis of all farming, for even stock farming could not be carried on without reference to the soil, since it is necessary for the provision of fodder and of grass for pasturing. It is to the soil, consequently, that we must devote our attention before we proceed to study agriculture proper (*i.e.*, "the cultivation of the soil") or farming generally (*i.e.*, "the using of the farm"—which means the production of crops, live stock, and live stock products, for which the soil is the prime necessity). Before we begin our study of the soil, however, it will be as well, since we have used the terms "agriculture" and "farming," to devote a few lines to explaining their real meanings, since many people confuse the two.

Agriculture has been described as "the art of cultivating the earth": the derivation of the word, in fact, supplies us with its real meaning—"cultura agri": the culture of the field, or land. Every process that has for its object the production of crops comes under the heading of "agriculture."

The word "farming" has a broader sense than "agriculture." Whilst farming in nearly all cases has agriculture as its base, it nevertheless goes beyond agriculture pure and simple, as it may include any of the various branches of stock raising (*e.g.*, dairying, meat production, wool production, ostrich rearing, and so on). Farming may, in fact, have no connection with agriculture pure and simple, and may, for example, consist of sheep farming only.

There are two main kinds of farming, then: agricultural farming and pastoral or stock farming; whilst from a combination of these two branches we get a third kind, known as "mixed farming."

Natal may be taken as an example of a country where these three kinds of farming are carried on together. Our Colony is divided into three geographical "belts" or "terraces," running fairly parallel with the coast-line, and known respectively as the Coast Belt, the Midland Belt, and the Upland Belt.* The class of farming mainly carried on varies, as a result, with each belt. On the coast belt agricultural farms preponderate; in the midlands the farms are as a general rule devoted

* The Magisterial Divisions that are included in each of these belts are as follows :—

Coast Belt: Lower Umzimkulu, Alexandra, Umlazi, Inanda, Indwedwe, Lower Tugela, and Mapumulo. *Midland Belt*: Impendhle, Alfred, Isopo, Richmond, Umgeni, Camperdown, New Hanover, Lion's River, Umvoti and Krantzkop. *Upland Belt*: Underberg, Polela, Bergville, Estcourt, Klip River, Umsinga, Dundee, Newcastle, Vryheid, Ngqoshe, Utrecht, Paulpietersburg and Babanango.

to "mixed farming"—that is, partly agricultural and partly stock raising—although the tendency is towards stock farming; whilst in the upland belt stock farming preponderates. In this connection it is interesting to note that the farms in the coast belt carry not quite two per cent. of the total live stock of the Colony, while the midland farms between them carry 32 per cent., and the upland farms 66 per cent. On the other hand, on the coast 24 per cent. of the total farm area of that belt is cultivated, while the midland farms have 7.2 per cent. of their total area under crops, and the farms of the upland belt 1.8 per cent.

Imagine a time in our earth's history when the dry surface of the globe was nothing but rock—hard rocks of various kinds quite devoid of soil. Even now, the whole of the dry surface of the globe is not some parts of the world with no covering of soil, and examples of this on a small scale can be found in Natal.

It is from this rock that the soil has been formed, and consequently from this rock, too, the soil has derived its mineral characteristics. Rocks are composed of minerals, and, whilst there are several hundreds of kinds of minerals known, only about six or seven are of importance as the bases of soil material. These are: Felspar, Quartz, Mica, Calcite (Limestone), Hornblende, Augite, and Kaolinite (Clay).

When did the soil of our globe first begin to form? To this question no answer can be furnished, but throughout geological time there has been an innumerable succession of soils; fresh rocks have been formed, and these in turn have commenced to break up and form new soil; and so the process has been going on, and is going on, continuously.

So much for the origin of soils. Our next question is the formation of soils: granted that soils are formed from disintegrating rocks, *how* are they formed? What agency or agencies bring about this disintegration of the rock with its resulting "soil"?

Soils are formed chiefly as a result of the action of the weather, known as "weathering." This is a process which we must examine in some detail if we are to understand it properly.

The different agencies responsible are (1) Water; (2) Heat and Cold; and (3) Chemical Action. We will briefly discuss these three agencies in turn.

Water.—Water brings about disintegration of the rock directly (*a*) by soaking into the rock and dissolving out any soluble salts it meets with and thus helping to loosen the mineral particles, and (*b*) in cases of large areas of bare rock, by forming streams which gradually wear off particles from the rock and deposit them elsewhere.

Heat and Cold.—Water indirectly brings about disintegration by freezing in winter in the rock into which it has soaked. When water freezes it expands, and by this means it causes portions of the rock to break off in scales, lumps, or blocks. You may notice this process going

on old brick walls and on the boulders in the veld. The heat of the sun in summer has also a considerable influence, and the alternating heat of the midday sun and cold of the night go far towards breaking up rocks by expansion and contraction.

Chemical Action.—Probably most people have noticed the “rusting” of rocks, resulting in pieces falling from the rock from time to time. This “rusting” is produced by the oxygen in the atmosphere, which causes the iron in the rock to “oxidise,” as it is called, thus destroying its cementing power and causing the rock to fall to pieces.

So far, however, the “soil” we have obtained by these agencies is not the soil that farmers know and speak of; it is not soil that will produce crops, for you can still find quite large patches of rock in dune crops, but merely debris containing mineral matter, which is insufficient for the proper growth of farm crops. The lower forms of vegetation, such as mosses and lichens, take possession of this “soil” first. They are, in fact, of so primitive a character as to be able to grow on the surface of the rock itself, utilising the raw mineral material of the rock and the air for their support and growth. These primitive plants decay and so furnish a certain amount of organic matter to the “soil,” and it is from this point that we can, with any justice, speak of the rocky debris as “soil.” The soil, such as it is, is now fitted to produce plants of a higher type, which, as they also decay, render the soil more and more capable of producing higher plants and more luxuriant growth.

When the decaying vegetable matter accumulates in excess we have what are called peaty soils, considerable areas of which are to be found in Great Britain and other portions of Northern Europe.

The decaying vegetable and animal matter in soils is called *humus*. Peat soils are thus all *humus*.

Another and very important agency by which the surface soil has been brought to a relatively productive state is, as Darwin has shown, the earthworm. These worms live on the vegetable matter of the soil; and to obtain this vegetable matter they take in large quantities of earth, which passes through their bodies and is thrown up on to the surface of the soil in the form of the little lumps familiar to everyone. This earth they bring up from the lower layers, so that their value is two-fold: they bring up the lower soil to the surface, and they reduce it to a state of great fineness. Besides this, they are always dragging dead leaves, etc., into their burrows, thus adding to the organic matter in the soil; and their burrows themselves serve to admit air and moisture into the soil.

Mention must also be made of the part that microbes play in the soil. These microbes bring about the transformation of plant tissue

into humus. They also bring about the development of various acids—such as nitric, carbonic, humic, ulmic, and so on—and they are of importance in connection with the practice of manuring, as will be explained in other articles.

The Use of Lime in Cultivation.

THERE are very few soils that are not benefited by the use of lime dressings. Lime may be applied to land in one or other of three forms, either (1) by slaking with water and applying at once. This, in the language of the farm, is known as hot liming; (2) by putting it into heaps like dung, and covering the heaps with soil for a short time till the lime falls into a fine powder; and (3) by grinding the lime into a fine powder and then spreading it on the soil. This last-named form of applying lime is a recent practice, but is now looked upon with great favour by English agriculturists. Of course, land resting on limestone formations does not require the application of lime. The indications of land requiring lime on pastoral land can easily be determined by the character of the herbage. On some pastures it is found that the stock have no particular desire to keep the grass short. That is a sure indication of the want of lime. Lime is a constituent of bone, and necessary for the building up of the skeleton; and may be derived to some extent from the water they drink, but, in most cases, is derived largely from the food consumed. On that account, limestone soils are often preferred by horse-breeders. The rearing of young stock on a farm thus tends to exhaust the soil of lime.

It is common belief among farmers in the Old Land that lime opens up stiff, heavy soils, and binds together sandy soils. This, at first sight, appears paradoxical, but it is perfectly true. But the actions in each case are distinct. In the case of heavy clay soils, the lime causes the soil to lose its plastic state. The fine particles are granulated, or flocculated, thus admitting air and allowing water to pass more freely through the soil. For this purpose, the hot or caustic lime is most effective. On light sandy soils, which contain vegetable matter, its "binding" effect is due to the lime combining with the humus. This compound of lime and humus is a powerful cement, and binds the particles together. Hot lime has to be used with caution on such soils. It has been shown by Professor John Porter, B.Sc., that meadow hay, for instance, takes 32·1 lbs. of lime for every $1\frac{1}{2}$ tons of hay taken from the land, and other crops in proportion; or taking an average of all ordinary farm crops, 30 to 40 lbs. of lime each year from

the soil. Some lime is also required for correcting the acids which accumulate in the soil. The great use of lime is to unlock or liberate the plant food in the soil, and render it available for crops; but it should be remembered that liming land poor in humus is of little use, unless it be to improve the mechanical condition of the soil. A farmer desirous of testing the value of lime on his land should get a few loads of it and try a load on each of several portions of his farm. The results of a simple experiment like that will show whether liming on a large scale is justifiable.—*Queensland Country Life*.

Muscles of the Horse.

ABOUT forty per cent. of the weight of an ordinary horse is muscle. All muscles concerned with locomotion are attached to bones, and when they contract they cause the bones to which they are fastened to move. The lower part of a horse's legs are nearly all bones, but the muscles in the body and upper part of the limbs are attached to various parts of the bony construction by tendons, and can thus produce a motion of the parts located some distance away.

The amount of motion produced by the action of, say, one of the horse's hind legs, will depend upon the length of the muscles and the relation of the bones to which they are attached. The commonest idea among students of this subject is expressed in these words: "Long muscles for speed, short muscles for power."

Newly-Hatched Chicks.

Avoid feeding the little chicks until forty-eight hours old.

Give fresh water and grit before food, and let the first meal be not more than they will pick up in five minutes, including the learning how to eat.

Five times a day for meals, and five minutes at a meal, should be the rule for the first two weeks. Then lessen to four and soon to three meals daily. Clean the feeding board after every meal, and if milk is given the dish must be cleaned and scalded daily.

Charcoal kept in the drinking water will help to ward off indigestion.

Sunshine is good medicine, but if it is excessively hot some shade should also be provided. The chicks will readily adjust themselves to the proper temperature if given a chance.

Good grass in pleasant weather is the best place for the chicks.

Sheep Notes.

If you keep sheep at all, put good enough blood in them to get the very best returns from their products.

When early lambs are wanted, it is best to commence feeding the ewes grain two or three weeks before breeding them, or else give them fresh, flush pasture runs.

With all classes of stock, the value of good feed is wonderfully increased by close attention.

Whatever the breed is, profit requires that the greatest feasible amount of mutton be got out of it.

With sheep, as with all animals raised especially for meat, the greatest profit in feeding is gained while the animals are young.

There is no wool in the flock so important as the yearling fleeces, and the success of the wool crop depends almost entirely on the care of the lambs.

The fleece from a well-fed sheep of any breed is much heavier than from a poorly-fed sheep.

The character of wool varies much with climate, soil, etc., which necessitates many sub-divisions.

"Starters" and Their Use

A "STARTER" is merely a name given to milk specially soured for the purpose of hastening the ripening of sweet cream for butter-making, also in increasing the acidity of milk in cheese-making. Butter-milk, for example, may be used as a starter, or, in other words, as a means of starting or inducing lactic acid to form more quickly than it would do if unassisted. Ordinary sour milk, or butter-milk, are known as natural starters to distinguish them from a starter prepared in the laboratory from pure cultures of the lactic acid bacteria.

"Agrostis," writing in *Farm, Field and Fireside*, gives some useful points as to how to make an ordinary or natural starter. Place a quart of perfectly clean new milk, he says, drawn from a healthy cow, in equally clean surroundings and allow it to sour, the temperature being maintained at about 75 deg. Fahr., when it will become acid in from 15 to 24 hours; then skim off the top portion and throw away, afterwards mixing and stirring the remainder with several gallons of separ-

ated or skim milk which has been pasteurised by heating for twenty minutes to a temperature of 185 deg. Fahr.

The milk, which is now inoculated with the lactic acid bacteria, should be covered over with a clean muslin cloth and left to sour, meanwhile stirring at intervals, when, on the following day, the starter will be ready for use. To renew the starter, place one pint of it into two gallons of pasteurised milk and, when sour, add a little of it to the fresh cream when desired to promote starting.

ALCOHOL FROM SAWDUST.—The Paris correspondent of *The American Sugar Industry and Beet Sugar Gazette*, writing under date of May 27, 1909, says:—"There has been a great deal of talk lately about the manufacture of alcohol from sawdust and wood chips. Chemists have long known that this was feasible, but hitherto no attempt has been made to carry on the process on a large scale. A procedure, known as the Classen patent (French No. 365,595), which was recently granted, consists in heating the sawdust, along with sulphurous gas, in lead-lined digesters to a temperature of 250 deg. to 300 deg. F. for an hour. The acid and the oxygen of the air oxidize the cellulose matter, a portion of which is converted into glucose or 'grape sugar.' This, after being washed, is treated with an ordinary alcoholic ferment, and any excess of acidity is corrected by the addition of carbonate of lime. The company which is working this Classen process estimate they will be able to manufacture at once 250,000 gallons of wood spirit, but in the near future they anticipate they can more than triple this output, and later to bring it up to two million gallons, so that eventually they will be in a position to manufacture some five million gallons per year—or about one-eighth of the whole quantity consumed. Whether the said company will ever be able to manufacture from a ton of sawdust, costing \$7.00, some 24½ gallons of alcohol, at a net profit of \$10.50, is a matter of conjecture. It should be mentioned that in addition to the alcohol there would be some 6 gallons of acetic acid and about 1,700 pounds of 'cake,' which could be used for cattle feeding, if the Classen patent will do *commercially* all that is claimed for it. There is a great difference between a laboratory achievement and an industrial success. If it can accomplish these results the effect will be disastrous to the beetroot alcohol market, and more especially to those factories and refineries where both sugar and alcohol are manufactured. It would also lower the price of sugar most probably, for that large portion of the beet crop which is now used by the distilleries would have to be employed solely for the purpose of sugar-making."

Coal and Labour Return.

Return of Coal raised and Labour employed at the Natal Collieries for the month of July, 1909:—

COLLIERY.	Average Labour Employed.					Output.
	Productive Work.			Unproductive Work.*	Total.	
	Above Ground	Below Ground.	Total.			Tons. Cwt.
Natal Navigation ..	382	619	1,001	18	1,019	27,118 0
Elandslaagte ..	308	650	958	15	973	18,177 4
Dundee Coal Co. ..	277	481	758	—	758	15,739 18
Durban Navigation ..	212	454	666	—	666	13,063 0
St. George's ..	222	465	687	—	687	13,633 0
Natal Cambrian ..	204	360	564	10	574	12,637 19
South African ..	126	296	412	53	465	12,184 2
Glencoe (Natal) ..	172	369	541	46	587	12,028 8
Talana... ..	130	385	515	17	532	9, 38 0
Newcastle ..	82	381	463	—	463	6,988 15
Hloabane ..	85	226	311	30	341	6,069 13
Natal Steam Coal Co. ..	90	195	285	—	285	5,538 12
Ramsay ..	87	151	238	7	245	3,880 0
Hatting Spruit ..	75	115	190	—	190	2,627 15
West Lennoxton ..	57	82	139	—	139	1,571 13
Ballengeich ..	59	86	145	28	173	1,920 0
Dundee Coal Co. B'mside	17	56	73	134	207	95 0
Dewar's Anthracite ..	5	7	12	—	12	35 0
Vryheid † ..	10	6	16	—	16	26 0
Makatees Kop ..	4	—	4	—	4	12 0
Totals ..	2,604	5,374	7,978	358	8,336	161,183 19
Corresponding month, '08	2,024	5,185	7,209	703	7,912	189,495 1

			Productive Work.			Unproductive Work.	Total, July, 1909.	Total, July, 1908.
			Above Ground.	Below Ground.	Total ¹ .			
Europeans	..	..	199	170	369	52	421	370
Natives	..	..	892	3,394	4,286	192	4,478	4,866
Indians	..	..	1,613	1,810	3,323	114	3,437	2,953

* Cost Charged to Capital Account.

† Includes June return, 16 tons.

CHAS. J. GRAY,

Mines Department, Maritzburg, 9th August, 1909.

Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal bunkered and exported from the Port of Durban for the month of July, 1909:—

	Tons.	Cwt.
Bunker Coal	74,315	18
Coal Exported	40,948	13
Total	115,264	1

Customs House, Port Natal,
2nd August, 1909.CHAS. WINSER,
pro. Collector of Customs.

Meteorological Returns.

Meteorological Observations taken at Govt. Stations for Month of July, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.).				RAINFALL (IN INCHES).						
	Means for Month.		Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heavy's train-fall in 1 day.		Total for Year from July 1st, 1908.	Total for same period from July 1st, 1908.	
	Maximum	Minimum					Fall.	Day.			
Observatory ..	74.8	54.6	85.5	46.8	1.81	5	1.73	7th	1.81	.40	
Stanger ..	75.3	54.1	86	47	1.31	4	1.11	6th	1.31	.34	
Versham ..	77.1	50.1	87	44	1.61	4	1.61	6th	1.61	.24	
Greytown ..	63.9	37.7	80	23	.73	1	.73	6th	.73	Nil	
Newcastle ..	72.7	29.8	78	21	.80	1	.80	7th	.80	Nil	
Mid-Illovo ..	73.7	48.7	86	40	1.12	4	.94	7th	1.12	.14	
Estcourt ..	70.2	31.9	77	24	.34	3	.34	7th	.34	Nil	
Lidgerton ..	71.1	31.7	82	21	.64	2	.51	6th	.54	—	
Umbogintwin ..	74.9	48.6	85	37	1.98	5	1.74	7th	1.98	—	
Imbizana ..	73.2	52.0	92	43	1.17	3	.91	7th	1.17	.26	
Port Shepstone ..	82.5	52.5	92	48	1.20	2	1.00	6th	1.20	.70	
Umzinto ..	82.5	48.3	87	42	1.39	1	1.39	6th	1.39	.02	
Richmond ..	71.2	43.1	83	35	.71	4	.67	6th	.71	.09	
Maritzburg ..	73.9	40.3	83	32	.32	3	.68	6th	.82	.02	
Howick ..	67.8	35.3	79	23	.62	2	.55	6th	.62	.05	
Ladysmith ..	74.3	37.7	85	29	.56	2	.43	6th	.56	—	
Dundee ..	67.5	43.4	75	33	1.04	2	.77	7th	1.04	Nil	
Weenen ..	74.9	32.9	85	25	.36	3	.33	7th	.36	.02	
Krantzkop ..	75.8	46.1	80	40	Nil	—	—	—	Nil	.11	
New Hanover ..	73.7	39.2	80	32	.78	2	.68	6th	.78	Nil	
Nqutu ..	63.5	40.6	74	34	.69	2	.49	6th	.69	—	
Utrecht ..	74.6	25.3	81	23	.71	1	.71	7th	.71	—	
Nongoma ..	71.3	45.6	84	39	.31	4	.20	8th	.31	—	
V yheid ..	68.8	43.0	75	37	.74	2	.50	8th	.74	.13	
Mtunzini ..	76.2	55.9	80	50	4.96	5	3.70	7th	4.96	2.83	
Hiabisa ..	77.9	56.2	87	50	.44	2	.30	7th	.44	.37	
Umbombo ..	69.3	53.8	83	48	.05	1	.05	7th	.05	.16	
Ru, angeni ..	76.5	48.7	86	41	3.26	2	2.90	7th	3.26	1.51	
Point ..	—	—	—	—	2.62	4	2.30	6th	2.62	.47	
Krantzkloof ..	75.2	60.9	88	44	1.07	1	1.07	7th	1.07	.01	
Nottingham Rd. ..	64.3	25.6	78	14	.41	1	.41	7th	.41	—	
Ngoni Forest ..	—	—	—	—	1.06	6	.53	7th	1.06	—	
Mohlabatini ..	77.9	44.0	86	38	.37	1	.37	7th	.37	.01	
Bulwer ..	—	—	—	—	.61	4	.47	6th	.61	Nil	
Ixopo ..	—	—	—	—	.72	2	.64	6th	.72	Nil	

Meteorological Observations taken at Private Stations for Month of July, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.)		RAINFALL (IN INCHES).						
	Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain- fall in 1 day.		T. tal for Year from 1st July, 1909.	Total for same period from July 1st, 1908.	
					Fall.	Day.			
Adamshurst	80	31	0.65	2	0.55	6th	0.65	Nil	
Hilton.. .. .	79	32	0.77	3	0.2	6th	0.77	0.08	
P.M.B., Botanical Gardens	—	—	0.78	2	0.77	6th	0.78	0.04	
Ottawa	—	—	1.63	3	1.36	7th	1.62	—	
Umhlangeni	—	53	0.48	2	0.85	7th	0.88	0.42	
Equeefa	93	47	0.93	1	0.93	7th	0.93	0.17	
Umzinto, Beneva	—	—	1.01	2	0.98	6th	1.01	0.07	
Reit V. ei	—	—	—	—	—	—	—	—	
Bransholme	—	—	—	—	—	—	—	—	
Cedar—Hill Station	81	39	0.63	2	0.60	7th	0.63	Nil	
„ Vlei Station	77	23	0.64	2	0.59	6th	0.64	Nil	
Winkel Spruit.. .. .	85	41	1.77	2	1.65	6th	1.77	0.03	
Weenen	84	27	0.27	2	0.25	6th	0.27	0.01	
Giant's Castle.. .. .	65.3	36.8	0.69	3	0.50	7th	0.69	0.04	

Return of Farms at Present under Licence for Lungsickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Craw	Ladysmith	Scab	E. Moreland	Bit Kuil
			Mrs. M. J. v d Merwe	Coolfontein
			Natives	Roosboom
			Natives	Marie's Kraal
			H. Raath	Putteni Spruit
			T. J. M. Buys	Reuit Kuil
			A. W. Illing	Flagstaff Spruit
			Natives	Goedgedacht
			Mrs. Spring	Le-erve
			A. G. Dannhauser	Riet Kuil
			J. C. Buys	"
			Natives	Roosboom
			Natives	Blew Bank
			Natives	Phooflaai
			J. Farquhar	Stewart Park
			J. Hyde	Hydeswood
			Natives	Kleinfontein
			Natives	Rooipoot
			Sparks Eros.	Bimley
			Harvey	"
A. B. Koss	Portion of Festeourt	"	G. B. Jones	Bergveld
A. C. Williams	Utrecht	"	Schlanders Bros.	Kelvin
			Umlumbo	Twyfel ontein
			Umtellen	Do.
			Natives	Groot Vlei
			Mrs. R. P. Spies	Goede Hoop
			Natives	Onverwacht
			Natives	Groot Vlei
			Natives	San'spruit
			Tol Nel	Welhoek
			J. van Schalkwijk	Wetvreden
			M. L. Adendorff	Waterval
			A. T. de Jager	Eenkanthango
			J. F. Meyer	Rooie Zand
			T. Bezuidenhout	Vogelkrantz
			Natives	Beaunw
H. Van Rooyen	Babanango	"	Natives	Goedgelooop
			P. I. Uys	Town Lands
			Sieckwana	Hart-togd
			Natives	Hartstogd
			C. van Rooyen and	"
			Natives	Vriendschap
			Natives	Evergreen
			Natives	Faardeplant
			Natives	Swartfontein
			Natives	Welverdiend
			Natives	Uitkyk
			Natives	Verduveld
			Yalwago	Location
			J. T. Clothier	Whitcliff
			G. Knox	Knoxwood
L. Trentham	Alfred	Lungsickness	Sigum	Lot F
			Mqnnansla	Omega
			Spingaan	Hawarden
			Jabula and Sonjela	Mount Pleasant
			"	"
		Scab	Incatti	Location
			Makerlu	"
			G. Hogg	Lorna Doone
			Smith & Braithwaite	Loskop
			W. Holmes	Howick Commonage
		Lungsickness	P. Allen	Welverdiend
			P. Marais	Make-aeskop
			T. Uys	Morgenzon
			C. J. Combrink	Kuilspruit
			C. J. van Rooyen	Jachtplan
J. Ralfe	Lion's River	Scab	A. Herbst	Schikhoek
			A. Kusel	Jachtdrift
			J. C. Brschoff	Dordrecht
			P. van Rooyen	Leliefontein
			D. Grezel	Spilhoek
			E. Dodds	Jachtdrift
			C. C. mbrink	Pivaan
			D. van Collier	Schuruberghoek
			C. P. Botha	"
			"	"
C. T. Vaughan	Paulpietersburg	"	"	"
			"	"
			"	"

RETURN OF FARMS UNDER LICENCE (Continued).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
C. T. Vaughan ..	Paulpietersburg ..	Scab	Natives ..	Schuruberghoek
		"	A. J. Kriel ..	Vaalkop
		"	G. P. Slabbeit ..	Pardefontein
		"	H. E. Ries ..	Wolgelegen
R. Wingfield Stratford	Newcastle ..	"	N. J. Els ..	Viljoen's Rest
		"	Natives ..	Town Lands
		"	Rapane ..	Walmsley
		"	W. Moiler ..	Mard-nash
		"	W. Steel ..	Botha's Pass
		"	T. Ball ..	Ruston
		"	A. P. de Jager ..	One Tree Hill
		"	H. O. Eksteen ..	De Wetstroom
		"	Natives ..	Stalkrantz
		"	H. Hamilton ..	Glendale
		"	S. W. Reynolds ..	Town Lands
		"	F. R. Muller ..	Leyden
		"	J. S. Watson ..	B'smarek
		"	M. C. Adendorff ..	Sandford
		"	Natives ..	Chef's Lek
C. E. Walker ..	Portion of Estcourt	"	J. Dixon ..	Blauwbosch
		"	Angus Wood ..	Harte Rivier
		"	M. J. Oosthuizen ..	Enden Vlei
		"	T. Lazenby ..	Springbok
		"	Oates, W. E. ..	Outsdales
		"	Mrs. J. H. Wallace ..	Cliffdale
		"	A. Stuart ..	Glen Stuart
		"	Natives ..	"
		"	J. McFie ..	Lowlands & Stocklands
		"	H. T. K. Miller ..	Bea on Hill
G. Daniell ..	Vryheid ..	"	A. Carter ..	Glendone
		"	F. H. Kerr ..	Rock Mount
		"	Mankulu ..	Hartbeetate
		"	Mkelegana ..	"
		"	Mzinzi ..	Groenkop
		"	Kuyeze ..	Mooiplaat
		"	Natives ..	Borlin
		"	J. H. Gunter ..	Palmietfontein
		"	Natives ..	Wag-ndrift
		"	Natives ..	Prado
		"	Natives ..	Bedrog
		"	Natives ..	Vleiplants
		"	T. Curtis ..	Sandhurst
		"	Natives ..	Dugemad
		"	Natives ..	Rustenburg
		"	Mrs B. Webbe ..	"
		"	C. Bencke ..	Langkraus
		"	M. v. d. Westhuizen ..	Vaalkopje
		"	Natives ..	Gruinstoot
		"	Natives ..	Prado
		"	Natives ..	Zaaifontein
		"	Natives ..	Kandlaspruit
		"	Natives ..	Alpha
		"	J. J. Odendhal ..	Vilkomst
		"	J. P. Greening ..	Hartbeestekrugte
		"	H. D. P. Rabe ..	Langkraus
		"	J. J. de Jager ..	Vr dehof
		"	J. A. Viljoen ..	Stillwater
		"	F. Combrink ..	Bankroet
		"	P. J. Swarts ..	Aloeboom
		"	J. M. Kockemoor ..	Scheeperslaagte
		"	Natives ..	Schurhoek
		"	J. Birkensstock ..	Vergelegen
		"	S. Labuschagne ..	Aloeboom
		"	J. N. Swart ..	"
		"	C. S. van Rooyen ..	Bloerendal
		"	D. Swarts ..	Aloeboom
		"	Mical ..	Groenkop
		"	C. van der Merwe ..	Nooitgedacht
		"	C. van Rooyen ..	Bloerendal
		"	P. Tredoux ..	Weinansrest
		"	J. H. Lombard ..	D. Iefenstein
		"	H. A. Lombard ..	"
		"	A. W. Mey ..	Kromellur'org
		"	G. H. van Rooyen ..	Vrosgewacht
		"	W. F. van Rooyen ..	Bloemendal
J. R. Cooper ..	Nkandhla & Nqutu	"	A. Jansen ..	Frauintzicht
		"	Ncede Biyela ..	Mpandhleni
		"	Mgele Biyela ..	"
		"	Natives ..	Engazini

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
J. R. Cooper ..	Nkandhla & Nqutu	Scab	Natives ..	Mkonjana
			Natives ..	Macebo
			Natives ..	Selutshana
			Natives ..	Nqutu
			Natives ..	Telezi
			Natives ..	Tshutshosini
			Natives ..	Hlazagazi
			Natives ..	Masodzeni
			Natives ..	Blood River
			J. G. du Preez ..	Nondweni
			Natives ..	Mbilane
			Natives ..	Huladu
			Natives ..	Engezini
			C. E. Parr ..	Sa dhlwana
			H. Muller ..	Nqutu
			Natives ..	Ncenceni
			Natives ..	Mapaswaneni
			Natives ..	Mkonjana
			Natives ..	Vants Drift
			Natives ..	Nondweni
			Natives ..	Mafethling
			Natives ..	Mkonjana
			D. C. S. Nel ..	Highfield
			H. Hansmeyer ..	Onres
			P. J. van Vuren ..	Driefontein
			C. S. Fouché ..	Kondelage
			Mjanja ..	"
			Natives ..	Langerwacht
			F. M. Borthwick ..	Mooi Vlei
			Natives ..	Mooklip
E. Vart ..	Western Umvoti ..	"	C. J. Vermaak ..	Groenogden
			J. A. Schultz ..	Onvewacht
J. F. van Rensburg	Ngotshe ..	"	J. C. Emmett ..	Goudhoek
			A. M. Potgieter ..	Good Hope
			B. C. Hatting ..	Avonduur
			Natives ..	Tochysgeisnde
			J. D. Bester ..	Smaldeel
			O. Zunkel ..	Rustenburg
			J. Caskel ..	Warhoop
			J. H. de Jager ..	Tulinchesnall
			Oyugnlangans ..	Umsinga
			George ..	Gordon Memorial
J. Stewart ..	Bergville ..	Lungsickness Scab	Tshantulu ..	Umsinga
			Susezulu ..	"
			Ngongola & Sonisen ..	"
			Nthubusu ..	Gordon Memorial
			Movenwa ..	Umsinga
			Sandhlwana ..	"
			Nyamans ..	"
			Amos ..	"
			Foposa ..	"
			Natives ..	Location
E. W. Larkin ..	Umsinga ..	"	Natives ..	Gordon Memorial
			Natives ..	Vaalkop
			T. H. Dalekind ..	Harding
			A. Muller ..	Sutherland
			W. W. Strydom ..	Oranje
			Natives ..	Craigulla
			Natives ..	Klippoort
			J. A. Nel ..	Veleegund
			Natives ..	Burleigh
			J. P. C. Nel ..	Spitzkop
R. Mayne ..	Eastern Umvoti & Krantzkop	"	W. Turpin ..	Olivefontein
			J. C. Nel ..	Spitzkop
			Natives ..	Ematimabolo
			P. and H. Mare ..	Speculation
			W. Havemann ..	Sophiadale
			J. T. Martens ..	Groenkop
			Bogwin ..	Arundel
			Nduba ..	Waverley
			Makafana ..	"
			Njoyeta'a ..	Lot 29
E. W. Bowles ..	Ixopo ..	"	Gungatshi ..	Location No. 3
			G. H. Cooper ..	Avetary
			D. E. Hardman ..	Ellington
			Mandemba ..	Lot D. U.
			Tebenga ..	"
			E. F. Garland ..	Springvale
			E. W. Veley ..	Aythorpe
			Gangadene ..	Coolhill
			" ..	"
			" ..	"

RETURN OF FARMS UNDER LICENCE (Continued).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
E. W. Bowles ..	Ixopo ..	Scab	Solabamba ..	Gorton
		"	Godhloza ..	"
		"	J. Johnson ..	Vlei Cottage
		"	Bobejana ..	Lot K of 5
		"	Mangatshu ..	McKenzie
		"	Bojeni ..	Smithfield
		"	Koyesa ..	McKenzie
		"	G. Smith ..	Smithfield
A. H. Ball ..	Weenen..	"	J. P. Lotter ..	Berg Vlejt
		"	P. H. Van Rooyen ..	Buffels Hoek
		"	P. P. van Rooyen ..	Doomkloof
		"	Naude & Lotter ..	Scottshoek
		"	J. T. van Rooyen ..	Belle Vue
		"	Natives ..	Oribefontein
		"	Natives ..	Scottshoek
		"	Natives ..	Scottspoot
		"	Natives ..	Accilia
		"	J. R. van Rensburg ..	Blinkwater
		"	J. S. Els ..	S. ottsburg
		"	E. C. Robinson ..	Mona
		"	S. C. van Rooyen ..	Middelburg
F. Kruger (acting) ..	City, Un geni ..	"	Umveli ..	Zwaartkop Location
		"	Dria ..	"
		"	Samuel ..	"
		"	Jan'tje ..	"
		"	Laduma ..	"
		"	L. Taylor ..	"
		"	Ramen ..	Ellis' Estate
		"	J. Henwood ..	Hilton Road
A. J. Marshall ..	Dundee ..	"	A. C. Vermaak ..	Sigtuma
		"	T. C. Vermaak ..	Harrisdale
		"	J. W. de Bruyn ..	Rooifontein
		"	B. J. Badenhorst ..	Kem enveldt
		"	L. Badenhorst ..	Kelvin
		"	H. A. J. Davel ..	Kliprug
		"	C. T. Vermaak ..	Kalderfontein
		"	H. P. Handley ..	Giba
		"	D. C. Uys ..	Parys
		"	Honeywill & Taylor ..	Rietbokspruit
		"	Ha vey & Retallach ..	Sierkström
		"	Natives ..	Con le fort
		"	" ..	Ruigtefontein
		"	A. A. Tur on ..	Dundee Town Lands
		"	McKenzie & Kruger ..	Dabruy
		"	Natives ..	Klipport
		"	G. Lidgett ..	Northfield
		"	Natives ..	Waschbank
		"	Geo. Kremer ..	Dalry
		"	Natives ..	Biggersgat
		"	R. J. Marshall ..	Cleveland
		"	J. de Jager ..	Waschbank
		"	Natives ..	Blinkwater
		"	Natives ..	Hartebeestfontein
		"	Natives ..	Doomside
		"	J. Hatting ..	Limestone
		"	G. B. van Rooyen..	Singletree
		"	Natives ..	Goedkens
		"	Natives ..	East Hesterton
		"	C. M. Meyer, Sen..	Glad tone
		"	R. J. Marshall ..	Woodlands
		"	J. B. Wade ..	Stanton
		"	C. J. P. Landman ..	Iro dale
B. Klusener ..	Lower Umzimkulu..	Lungsickness	Nyapu ..	Berbeck
E. J. B. Hosking ..	Upper Umkomanzi	Scab	A. Nicholson ..	Roselands
A. Brown ..	Polela & Underberg	"	J. G. Mack ..	Seponore

MANGE IN HORSES EXISTS AS UNDER

Owner.	Farm.	District.
Pinda, Vete & Sobuon ..	Strathsoon	Impendhle
Natives ..	Olivefontein	Umvoti
Natives ..	Tetworth	Lion's River

Pound Notices.

NOTIFICATION is contained in the *Government Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :

ON THE 15TH SEPTEMBER.

Ashley, Ivopo.—Bay gelding, blaze, off hind foot white, tail cut square, very mangy, aged.

Engabeni, Alfred.—Cream gelding, aged, square cut tail, star, long coat, found straying on the 14th July, 1909.

Good Hope, Klip River.—Four Kafir goats, blue ram, black ewe, blue ewe and white ewe. Various ear marks.

Hope Farm, Newcastle.—Bay gelding two white hind feet, long mane and tail, no brands or ear marks ; bay mare, black points, long mane and tail, no brands or ear marks.

Vryheid.—Three Merino ewes, branded N in both red and black, also ear marks. Impounded by Mr. H. Lombaard, Bloemhof.

Woodstock, Bergville.—Running on the farm "Zuur Laager," and reported by C. Halferty as being too wild to be driven to Pound : Black mare, branded V.S. on right flank ; bay filly, branded what looks like S.M. on right flank ; black filly, no brands.

ON THE 7TH OCTOBER.

Acton Homes, Bergville.—Bay mare, about 14 hands, aged, and blind in the right eye, no marks or brands visible.

Donnybrook, Polela.—Black ram goat ; two black ewe goats ; white ewe goat ; white kid goat ; black kid goat.

Greytown. Running on the farm "Highbury," and reported by Mr. J. T. Martens as being too wild to be driven to the Pound : Merino ewe and lamb, brand invisible, looks like J-E, square on front of left ear. Probable value, 12s.

Klip Spruit, Normandien.—Five Merino ewes, in very poor condition, left ear square, cut out right ear, half moon.

Nqutu. Seven Merino sheep, two rams, five ewes, all with tip off left ears.

Richmond.—Black he goat ! three black she goats ; black kid ; he goat, black and red ; grey she goat.

Thornville Junction.—Brown or bay gelding, newly clipped, about 15 hands, branded L on off hip ; brown or bay gelding, newly clipped, about 15 hands no visible brand ; dark brown mule, long tail, shod on front feet, branded R over another brand, looks like /R on off rump.

Vryheid.—Two Merino ewes, with indistinct brand in red, like D, also ear marks, left ear three nicks the one half or top of right ear cut down middle. Impounded by A. McLeod, farmer, Vryheid District.

Woodstock, Bergville.—Five Black Kafir Sheep, two Black Kafir Sheep, rams, slit in back of left ear in each ram.

Notice.

OWING to the increasing demands upon our space, we have arranged to publish *quarterly* instead of monthly as hitherto certain standing reference matter. This matter will consist of (1) Scale of Charges for Vaccines, etc., at the Government Laboratory; (2) List of East Coast Fever Advisory Committees; (3) List of Executives of Farmers' Associations; and (4) List of Publications issued by the Department of Agriculture. In future readers will find this matter in the January, April, July and October issues of the *Journal*.

Farm Apprentices' Bureau.

LIST OF APPLICANTS.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | |
|--------|---------|--|
| No. 2. | Age 15. | Has had 18 months' experience of farming. Understands more about forestry than general farming. Speaks Zulu, and understands Dutch. |
| " 3. | Age 24. | Colonial born Has a knowledge of bookkeeping. |
| " 4. | Age 18. | Natal born. Anxious to learn farming. |
| " 5. | Age 24. | Speaks Zulu. Keenly interested in farming. |
| " 6. | Age 17. | Still at school. Speaks French fluently, and has a fair knowledge of German and Dutch. Is very well educated. Particularly anxious to learn farming. |
| " 11. | Age 18. | Has had two years' experience on a sheep farm in the O.R. Colony. Is particularly anxious to get back on a farm. Is very willing and obedient. |
| " 13. | Age 20. | Is an orphan. Is anxious to learn farming. |
| " 14. | Age 16. | Natal born. |
| " 15. | Age 19. | Is desirous of learning farming. |
| " 17. | Age 20. | Speaks Zulu. Is keenly interested in farming. |
| " 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. |
| " 26. | Age 18. | Has a knowledge of Zulu. Was brought up in a farming district in Scotland. |
| " 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. |
| " 30. | Age 18. | Transvaal born Has had experience on a mixed farm. Speaks Dutch and Zulu. |
| " 31. | Age 20. | Has a knowledge of engineering and carpentry. Is a Natalian. Anxious to learn. |
| " 32. | Age 15. | Has lived on a farm for some years. Speaks Dutch and Zulu fluently. Is very intelligent. |
| " 33. | Age 16. | Well educated. Speaks Dutch and Zulu. |
| " 34. | Age 18. | Has a slight knowledge of Zulu. Understands carpentry. |
| " 35. | Age 21. | Has had five years' experience on farms. Understands cattle and horses and Agriculture. Is anxious to get back on a farm. |
| " 36. | Age 20. | Colonial born. Was brought up on a farm. Has a knowledge of bookkeeping. Speaks Zulu. |

DRESSING FOR HARNESS.—The United States Government is responsible for the following recipe for a good harness dressing:—One gallon neatsfoot oil, two pounds of barberry tallow, two pounds beeswax, two pounds beef tallow. Put the above in a pan over a moderate fire. When thoroughly dissolved, add two quarts of castor oil; then while on the fire stir in one ounce of lampblack. Mix well and strain through a fine cloth to remove sediment; let cool, and you have as fine a dressing for harness or leather of any kind as can be had.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 115.—Englishman, 26 years of age, steady and an abstainer, with a knowledge of cattle and horses, wishes employment on a farm in Natal (English preferred) as a handy man, with a view to furthering his knowledge of farming in this country. Is willing to accept food and clothing in a good home, for services, for a few months with the prospect of a small wage after the first three months.

No. 116.—Cape man, age 32 years; married, no children. Has been used to working with horses and mules all his life. Has good papers from his previous employers, and was in the employ of the Public Works Department for over five years. Is willing to do anything in his power, but cannot read nor write.

No. 117.—Englishman, 25, of good education, desires appointment as overseer on a plantation in Natal, and would pay a reasonable premium and give services free for a few months if necessary. Has had commercial, engineering, surveying and mining experience.

No. 118.—Pensioner from the Army desires to obtain post on a farm. Is particularly fond of gardening. Has excellent discharge papers and good testimonials.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 121.—Desires open air employment. Age 43. Life experience of agricultural pedigree and prize stock gained in Scotland. Has been six years in South Africa. First-class references and testimonials. Small salary required.

No. 122.—A young man, with life-long experience of cane-growing, desires employment as manager or overseer on a plantation. Experience has been in Queensland and Fiji. Is good at figures and capable of taking charge of books if necessary.

No. 123.—Married man, 35 years of age, with 5 years' experience on poultry and stock farm in California, wishes to get on to a farm in Natal. His wife is a good cook and handy in dairy. Would be willing to work for a very small wage or for their keep for a period of twelve months at least, after which they would expect some remuneration. Can produce first class personal references.

No. 124.—Single man, 35 years of age, with 8 years' experience in management of buildings, machinery and labour on a tea estate. Can undertake any sort of building or repairs, and has had a good experience of agricultural work. Will undertake any correspondence. First-class references and testimonials.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

The more eggs a hen lays the smaller the size becomes.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
Commissioner of Mines.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, N. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

Lice can destroy more young turkeys than any other disease, and the battle against this insect cannot be made too strong.

A young turkey needs sunshine. Some people make a practice of shutting their turkeys up in close, dark coops for the first week or two after they are hatched.

Government Cold Stores and Abattoirs.**PIETERMARITZBURG.**

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

	Calves up to One Year old.	Cattle over One Year old.	For minimum number of 250 head per month.		For maximum number of 500 head per month.	
			Under 300 lbs. weight.	Over 300 lbs. weight.	Under 300 lbs. weight.	Over 300 lbs. weight.
1. Receiving per head	s. d. 0 3	s. d. 0 6	s. d. 0 6	s. d. 0 6	s. d. 0 3	s. d. 0 3
2. Killing and Cleaning "	2 3	3 6	2 9	3 3	2 6	3 0
3. Labour "	0 3	0 6	0 3	0 6	0 3	0 6
4. Disinfectants "	0 1	0 1	0 1	0 1	0 1	0 1
5. Bagging (4 Quarters) ... per body	1 9	3 0	2 6	2 9	2 3	2 6
6. Cleaning of Tripes each	0 6	0 6	0 6	0 6	0 6	0 6
7. Chilling of Beef, up to 72 hours or portion thereof per body	1 0	2 9	2 0	2 6	1 9	2 6
8. Chilling of Offal, up to 72 hours or portion thereof per set	1 0	1 0	1 0	1 0	1 0	1 0
Chilling and Freezing Beef—						
9. 1st week or portion thereof per body	2 0	4 6	3 9	4 0	3 6	3 9
10. 2nd " " " " "	1 0	4 0	3 3	3 6	3 3	3 3
11. 3rd and remaining weeks or portions thereof "	0 8	3 0	3 0	3 0	3 0	3 0
Chilling and Freezing Offal—						
12. 1st week or portion thereof per set	1 4	1 6	1 4	1 4	1 4	1 4
13. 2nd " " " " "	1 0	1 3	1 0	1 0	1 0	1 0
14. 3rd and remaining weeks or portions thereof "	0 9	1 0	0 9	0 9	0 9	0 9

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg,
21st December, 1908.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

MAIZE SEED.

Growers who may have for sale selected seed of the following types of maize are invited to communicate as early as possible with the Director, Cedara :—Horse Tooth, Hickory King, Boone County, Golden King and Yellow Dent.

POULTRY.

Orders will be received for selected cockerels of the following breeds for immediate delivery :—Bull Orpingtons, White Minorcas, Silver Wyandottes and Plymouth Rocks,

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

DEVON BULLS.

Offers are invited for three young South Down bulls, by imported bull, "Star of the West." Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible :—

- Admittance of Students to the School of Agriculture.—House Master, Cedara.
- Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.
- Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.
- Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.
- Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.
- Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.
- Agricultural Seeds, etc., for Irrigation Farming.—Curator, Government Station, Weenen.
- Fruit.—Orchardist, Cedara.
- Accounting Business.—Accounting Clerk, Cedara.

E. R. SAWER,
Director, Division Agriculture and Forestry,
Cedara.

A TEST FOR MILK.—A simple and effective test to determine whether water is present in milk may be made with an ordinary knitting-needle, if the needle is bright and well polished. Dip the needle into the milk and quickly withdraw it in an upright position. If the milk contains only a small quantity of water this will prevent even a drop of milk adhering to the needle.

NATAL GOVERNMENT RAILWAYS.

REVISION OF GOODS RATES FOR LOCAL TRAFFIC BETWEEN N.G.R. STATIONS.

With effect from 1st September, 1909, alterations will be made in the rates for goods carried under the Normal, Intermediate, Intermediate "B," Rough and Imported Produce Classes, in Local Traffic between N.G.R. Stations.

The classification of Agricultural and Dairy Machinery and Implements will on and from the same date be altered from the Intermediate to the Rough Class, and the rates for Fencing Material will be reduced.

Full particulars of the above revised tariffs, together with other general alterations, will be published later.

EDWARD R. ROSS,
General Manager.

Railway Offices, Maritzburg,
5th August, 1909.

SOUTH AFRICAN STUD BOOK.

A record of all classes of Stock; the object being to encourage the breeding of thoroughbred stock and to maintain the purity of breeds, thus enhancing their value to the individual owner, and to the country generally.

Application for Membership and Entries of Stock should be addressed:—

For CAPE COLONY ..	..	A. A. PERSSE, P.O. Box 703, Cape Town.
„ TRANSVAAL ..	..	F. T. NICHOLSON, P.O. Box 134, Pretoria.
„ ORANGE RIVER COLONY ..	..	E. J. MACMILLAN, Government Buildings, Bloemfontein.

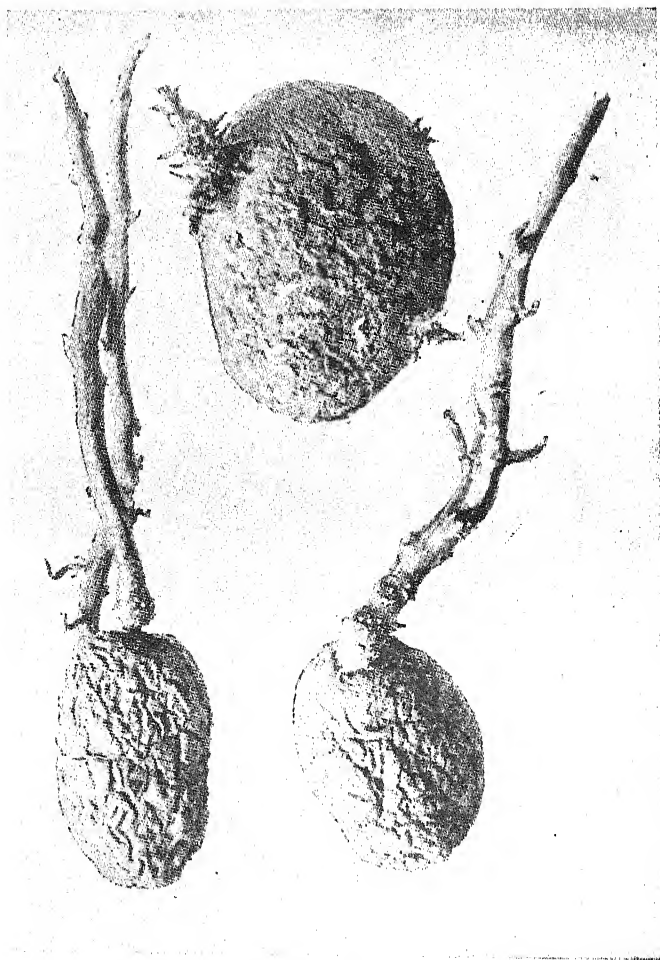
THE SOUTH AFRICAN STUD BOOK

IS OBTAINABLE OF:—

T. MASKEW MILLER,
ADDERLEY STREET, CAPETOWN.

PRICE 10s. 6d.

A. A. PERSSE,
SECRETARY, SOUTH AFRICAN STUD BOOK ASSOCIATION.



From the Journal of the

[British Bd. of Agriculture.]

THE "GREENING" OF POTATOES.

Greened and Ungreened Potatoes.

(See Article.)

*The Natal Agricultural Journal.****East Coast Fever.***

THE evil spectre of East Coast Fever continues to wage war against the Natal farmer. The grim destroyer has been successful to such an extent that only five Magisterial Divisions in the whole of this fair Colony can claim to be free from the disease; and it has now extended its pestilent arm to the southernmost end of the Colony.

And so we remain fast in the grip of a disease that, for its insidious nature, for the rapidity with which it spreads, and for the small percentage of recoveries among smitten animals, is by far the worst that has ever visited South Africa within civilised times. Were the disease directly contagious, instead of depending for its spread upon an insect which is common in the South African veld and which it is impossible entirely to eradicate, or were it even infectious, its control would present no very serious obstacles—no obstacles, at least, the greatness of which would lend any undue gravity to the situation—and we should not be faced with the wholesale destruction of our herds which, directly and indirectly, is the result of the ravages of the disease in its present form. An uninfected tick feeds on the blood of an infected animal; eventually it drops off, and six or eight weeks later attacks a “clean” beast, and is carried by that beast perhaps thirty, fifty, or even a hundred miles; the animal dies, and so a fresh centre of infection is created dozens of miles from the original one. Obviously the isolation of cattle and the stoppage of all movement of cattle are the only means of preventing the spread of the disease. Conjointly with this stoppage of the movement of cattle, the disease must be stamped out, that is, of course, by the removal and destruction of all infected and in-contact cattle.

“The Government has failed”; so goes the common cry of the usual body of fault-finders—the critics of the destructive order, who are expert hands at pulling to pieces and finding fault but who have never some better course to suggest. The Government has failed—certainly; but it has failed in a direction in which no other Government would have succeeded—namely, in dealing with the Natives. There it has failed—but not for want of trying—and there only; in no other direction has it failed, neither the Government nor the Division of the Department of

Agriculture that has been vitally concerned in the enforcement of suppressive measures.

The whole position may be summed up thus: The spread of the disease is best prevented by the definition and proclamation of "infected areas," and by the stoppage of the movement of cattle both in, to, and from those areas. The suppression of the disease, in the absence of remedies, is best provided for by the method of "stamping-out": in other words, by the destruction of infected and in-contact cattle. Those are the two main lines of policy to be adopted by the State in the interests of its subjects; and we think few thoughtful farmers will dispute the soundness of such a policy. Let us discuss the extent to which these two lines of action have been carried out in actual practice.

The spread of the disease has been effected by the illicit movement of stock both by Europeans and by Natives, but the Natives have, it is everywhere admitted, been the worst offenders. Whites who ought to have known better, have, however, also transgressed, but, we believe, only to a relatively limited extent. Steps were taken by the Government to prevent the movement of stock by Natives, but no measures can possibly be devised to prevent a Native from moving a beast if he is so minded: if he sets his heart on it he will do it, guards and fences notwithstanding. The Government recognised this, and in order to detect the illicit movement of cattle it was decided to enforce branding, so that a beast found outside its proper area as indicated by its brand could be shot, and, perhaps, the Native responsible for the movement of the animal discovered and punished. It was here, however, that the Government failed. The Native guards were found to be quite unreliable, and when branding was enforced in the locations there was a panic among the Natives and much movement of stock, resulting in the creation of new centres of the disease.

It has therefore been found impossible in practice to prevent absolutely all movement of stock; and perhaps in this direction a little more help might have been given to the Government by some of the Advisory Boards and Farmers' Associations than was the case, by reporting illegal movements of cattle.

As regards the second line of action—that necessary for the eradication of the disease—namely, stamping-out, it is perhaps in this matter that the Government has been most severely criticised, but, we insist, criticised ignorantly. To the ordinary farmer the movement of animals from an area of infection—no matter what the disease may be—must always involve the spreading of that disease. Certainly very laudably, our farmers have clamoured for stamping-out pure and simple: that is, the destruction of all infected and in-contact animals *on the spot*, with adequate compensation. It is, however, one thing to advise stamping-out; but carrying it out is a different matter altogether. Mr. Deane has estimated that stamping-out on these lines would require the pro-

vision by the Treasury of between £300,000 and £400,000; and we hardly think there is anyone among our farmers who will not agree that such an expenditure has been quite beyond Natal's means. Blood cannot be extracted from a stone, and when one line of action proves impossible of accomplishment the course the sane man follows is to adopt the next best line of action.

When the Government instituted the modified system of stamping out which is at present in force—namely, the removal of normal-temperatured in-contact cattle from infected areas to the Maritzburg and Durban abattoirs for conversion into meat—it acted with the full approval of its own expert advisers and in accordance with expert veterinary opinion in the Transvaal. The point to bear in mind is this: that, so long as a beast is of normal temperature, any ticks that may drop off him will not be infected and so will be incapable of transmitting the disease. This means that cattle from infected areas can be moved with perfect safety so long as their temperatures remain normal. This is a fact which over and over again our farmers have overlooked. As we remarked above, to the mind of the ordinary farmer the movement of cattle from infected centres always involves danger of the spread of the disease, but no intelligent farmer can fail to see that there is no danger attendant upon the movement of in-contact cattle for slaughter under the conditions to which we have just referred.

What course the Government would have adopted had there been ample financial provision for dealing with the disease on the severest lines it is not for us to conjecture, and such conjecture would be idle and unprofitable. The fact that we must bear in mind is that, whether or not the Government would under other circumstances have adopted the policy of stamping-out pure and simple, the Colony was not in a position to face the large expenditure which the adoption of such a policy would have entailed. The course which the Government did adopt, however, as we have said, met with the approval of expert veterinarians: and there is this to be said for the Government's system of modified stamping-out, that there has not been the wholesale destruction of wealth which stamping-out proper involves. A country in good circumstances could stand such loss, but Natal certainly could not.

A better understanding of the main points of a question that is before the country, and a little toleration when the action of the State at first sight seems inexplicable, as well as a little sympathy for the difficulties which confront our experts, whether veterinary or otherwise, would lead to much better practical results, and farmers would find that much more would be done for them than is at present the case when difficulties are placed in the way of the Department of Agriculture and smooth working is accordingly prevented. Co-operation always effects



Articles on Farm Machinery.

WE have pleasure in announcing that we are, with the kind co-operation of the various machinery merchants of Maritzburg and Durban, preparing a series of practical articles on farm machinery, beginning with ploughs and extending through all the various forms of special machinery. These articles will be well-illustrated—in fact, we think we are safe in saying that, thanks to the assistance which the machinery firms are giving us, we shall be able to give a pictorial representation of nearly every machine we describe. The first article will probably appear in the next issue of the *Journal*.

In preparing these articles we shall be guided by the needs of the farmer who lives out of easy touch with the towns, of the farmer who wants to know what machines there are on the *Natal* market, what their respective merits are, and what their approximate prices are. We have referred to the "respective merits" of different machines. Needless to say, we are not going to champion any particular make of machine in the line we are describing, but what we propose to do is to describe the construction of each machine in order that the farmer may compare the different machines described, pick out their faults and advantages so far as his own requirements are concerned, study their respective prices, and so on, and so choose the machine he thinks would prove most adapted to the requirements of his land, his draught-power, and his pocket. In some case we may be able to assist him in coming to a decision by giving him an idea as to the extent to which the machine concerned is sold. It is our ambition to describe every machine and every different make of machine at present purchaseable in Natal, with the approximate price of each in Maritzburg or Durban; and thereafter we hope, with the co-operation of the machinery firms, to keep our readers well-informed as to all new machinery arriving in the Colony. We think these articles will serve a useful purpose, and will save farmers much trouble and vexation, besides loss of money, and will enable them to secure more efficient machinery for their needs than perhaps they have been able to in the past.

Papaya Juice.

The United States Consul at Tuxpam, Mexico, refers in his last annual report to the manufacture of papaya juice in Mexico. Papaya juice is extracted from the fruit of the papaw tree, which grows freely in the coast districts, and also to some extent in the more inland portions, of Natal. Upon a very light superficial incision being made in the fruit, a clear water-like juice exudes therefrom, which becomes opaque on exposure to the air. The juice must be caught in porcelain-lined receptacles, and not in metal vessels, as it is very corrosive. It possesses great digestive virtues, and the refined article is considered superior to all animal pepsins.

In Mexico, after the desired quantity has been collected, the juice is placed in shallow porcelain or glass-lined pans and allowed to evaporate. While this is not a very delicate or difficult operation, it requires considerable attention, so that the juice may dry uniformly and the product be white and granulated. In its granulated state it is shipped to the United States, where it is subjected to a refining process, and used for medicinal purposes. In extracting the juice the hands should be protected by rubber gloves, as in its crude state it attacks the tissues. It is stated that an average tree will produce about a quarter of a pound of the granulated juice.

Freehold Tenure for Zululand Farms.

A Proclamation (No. 61, 1909) by His Excellency the Administrator announces that all farms classified as third-class farms, in Zululand, which have been alienated in leasehold may, if application be made by the lessee within four years from the date of allotment in leasehold, be converted into freehold tenure, at the option of the purchaser, upon certain conditions. These conditions, which appear as schedule to the Proclamation, are as follows:—(1) The farms to be valued by a valuator appointed by the Government; the valuation to be based upon a minimum value of 10s. per acre, and a maximum value of £1 per acre. (2) The purchase price to be paid in twenty annual instalments, the first instalment to be paid at the end of the third year from date of allotment in leasehold, and all moneys which have been paid to the Government by way of rent on the leasehold allotments shall be deemed to be payments on account of the purchase price of the freehold of the land. (3) The date of allotment in freehold shall be deemed to be the same date as the allotment in leasehold. All the conditions with respect to the allotment of land in Zululand, as set forth in the regulations promulgated in terms of Proclamation No. 51 of 1909, shall be embodied in the contract of allotment of land converted from leasehold into freehold in terms of these regulations.

Maize Export.

In view of the accumulation of maize at the Point, Durban, and the failure of consignees to effect prompt clearance, it is notified that, on and after date, the Railway Department holds itself free to call upon consignees to take delivery of any consignments within 36 hours of arrival, and that, failing such delivery being effected, the maize will be off-loaded in the open, when shed accommodation is not available, and will remain at the entire risk of consignees, Government undertaking no responsibility in regard to them, either as to their safety or as to any damage which they may incur from wet, or from any other cause whatever. Owners are reminded that export maize is conveyed and handled solely at the risk of the owner, and that the Department undertakes no liability in connection therewith, either during transit or at any other time. Previous notices as to free storage are modified accordingly.

Ostrich Farming.

In the course of an interesting letter to the Minister of Agriculture (Natal), a correspondent at Harvest Vale, Cape Colony, writes as follows regarding ostrich farming:—"As a farmer of over thirty years' standing in the breeding of ostriches I shall be glad to assist in helping to build up the industry in Natal. I have a fine strain of birds both in constitution and quality: at the Albany Agricultural Shows, where the largest exhibit of ostriches always took place and where I always exhibited largely, I was never beaten. I had also the honour to supply the Cape Court with the pair of ostriches for the Chicago Exposition. . . . I can supply good pairs at from £100 to £200 per pair and extra hens at from £35 to £35 each. These I would deliver on rail at Alexandria at my risk; and if 10 pairs were purchased and buyers wished to ship at Port Elizabeth, I would take experienced boys and assist in placing them on board. It takes from 8 a.m. to 4 p.m. to place them in Port Elizabeth from the Alexandra Station; and if shipping were previously arranged, the birds could be on board the same afternoon, and, I suppose, be in Natal in two days, whereas if sent all the way by rail it would take six to eight days, and birds six days in a truck are not very presentable at the end of the journey. . . . I shall be pleased to show anyone over my estate to see some 25 pairs of my breeding birds in their separate camps and also some 400 ostriches of different , all my own strain, hatched naturally by the birds on the farm." We shall be glad to forward the name of the writer of this letter to any reader who may desire to get into communication with him, since we believe there are a number of farmers in the Colony who are thinking of taking up ostrich farming, and they will no doubt be glad to know the name and address of a good ostrich-rearer in Cape Colony who is in a position to supply birds.

European Sugar Crop.

The United States Consul at Prague, writing with reference to the prospects of the European sugar crop of 1909, says that on account of differences between the sugar trust (refiners) and the farmers' organisation, there will be a decrease in the estimated sugar production of Bohemia for the present year. This season's estimated production of sugar in Bohemia is 670,000 tons, a decrease of 75,000 from last year; in Moravia, 450,000 tons, an increase of 25,000; and Hungary, 270,000 tons, an increase of 25,000. It is estimated that the acreage in Germany will show an increase of 3 to 4 per cent, and that of France, Belgium, and Holland an increase of about 5 per cent. The Russian acreage is hard to estimate, but the advices received indicate an increase of about 7 per cent. Taking Europe as a whole, it is estimated that the increase will be about 2 to 3 per cent. It is said that the Cuban crop is the one to be most seriously reckoned with in the sugar situation, as it may govern the sugar prices of the world.

A New Disease of Maize.

An article in a recent number of *Science*, by Dr. E. F. Smith and Florence Hedges, on the *Diplodia* disease of maize, is summed up by *Agricultural News* in its issue of the 7th August. It appears that these investigators made observations on this disease of maize, which is now becoming serious in some parts of America, in order to determine its method of infection. A careful examination of some cobs seemed to indicate that the mycelium spread to the seed from inside the stem, and that it was not a case of local attack as was previously believed. To prove this conclusively, plants were grown in pots with the soil previously inoculated with pure cultures of *Diplodia*. In nearly every case the fructifications of *Diplodia* appeared on the roots or at the collar of the plant, while the mycelium was traceable well up the stem and in the roots. In one case, the fructifications appeared in the stem on the first four internodes and were especially abundant at the nodes. It was fully determined that the mycelium in the roots and stem was that of *Diplodia*, as the pure cultures of the fungus were obtained from material inoculated with it.

This makes it almost certain that the fungus attacks the roots first from the soil and finally spreads to the cob, so that the same ground, when once infected, should never be used for planting two crops of corn consecutively. It is also suggested that the fungus may be the cause of the cornstalk disease of cattle in the west of America, as well as of the pellagra disease of human beings which results from the consumption of mouldy corn.

Transvaal Agricultural Statistics.

From a statement published by the Transvaal Department of Agriculture it appears that the live stock in possession of Europeans and Natives, respectively, in that Colony on the 31st December last numbered as follows:—Horned stock: 432,483, Europeans; 229,906, Natives. Horses: 52,166, Europeans; 3,767, Natives. Mules: 8,186, Europeans; 523, Natives. Donkeys: 16,240, Europeans; 10,220, Natives. Woolled sheep: 1,777,360, Europeans; Natives, *nil*. Other sheep: 751,345, Europeans; 281,348, Natives. Angora goats: 78,315, Europeans; Natives, *nil*. Other goats: 527,792, Europeans; 819,590 (?), Natives. Pigs: 71,851, Europeans; 95,752, Natives. Ostriches: 2,556, Europeans; Natives, *nil*. Poultry: 915,447, Europeans; Natives, *nil*. The principal items of produce for 1908 are: Wool, 8,042,148 lbs.; mohair, 417,604 lbs.; tobacco, 3,672 morgen; mealies, 1,437,334 bags; Kafir corn, 113,605 bags; wheat, 156,084 bags; oats, 20,189 bags; forage, 70,530,951 lbs.; orange trees, 261,463; vines, 1,115,937; fruit trees, 3,226,259. The area of land under cultivation is returned as 86,206 morgen irrigated, and 529,097 morgen dry.

Prices of Bananas in England.

The *Fruit-Grower, Fruiterer and Florist* (London) recently asked correspondents to forward particulars of the prices they are called upon to pay for bananas in different parts of the country. Among the replies received, the following two are published by our contemporary in its issue of the 15th July, and we reproduce them here as they may prove of interest to Coast readers:—"Gloucester" writes: Following is the ruling price here for bananas at present: To the wholesale merchants, 12s. per bunch; to retail shopkeepers, 12s. per bunch; to gut-termen, 10s. per bunch. The Banana Trust's representative here, I am informed and believe, will sell single bunches to individuals. "North Wales" writes: The price here for bananas seems to be anything you like, as they are sold in the streets by hawkers at no fixed price, paying no rates or taxes and going from door to door selling their wares at a minimum of 13 for 6d., while we shopkeepers cannot sell more than eight for 6d. to pay our way. We are paying Liverpool wholesale 6s. for extra bananas, and cannot buy cheaper for good sound stuff. Jamaicas or Costa Ricas are sold here at 6s. 6d. per gross—but only by one firm though. It is time the trade was better organised, or it will get into the hands of the grocers and hucksters who care not where the stuff comes from so long as they get a cheap line. The sale of choice English fruits seem to be getting worse every year, and our own fruit seems to be actually going out of favour.

A Patent Rubbing Post.

According to an exchange, an inventor has carried the automatic idea to the extent of enabling live stock themselves to apply insecticide or soothing oils to parts that are irritated or affected by vermin. The invention consists of a rubbing-post in which is a reservoir filled with the insecticide, and which may be placed at any suitable place convenient to the live stock. The rubbing-post is formed with a central reservoir, in which the oil is kept. Between this and the outer casing of the post is a felt-like filling. A wick serves to carry the oil from the reservoir to this filling. The outer casing of the post is perforated, so that when the animal rubs against it the oil will exude from the perforations, and be spread upon the affected part.

Feeding Dairy Cows.

The Durham County Council Education Committee has issued a report on further experiments on the feeding of dairy cows, conducted at Offerton, Durham, by Mr. Frank P. Walker, B.Sc., and Mr. S. H. Collins, M.Sc., of Armstrong College, Newcastle. The report contains the results of dairy investigations during the summer of 1907, the winter of 1907-8, and the summer of 1908. Prolonged experiments were made to test the effect of brewers' grains on the quantity and quality of milk, with the following conclusions.

(1) A moderate allowance of 20 lbs. of brewers' grains per day has the effect of increasing, at all events for a certain period, the daily yield of milk. (2) It would seem that the period over which such increase is maintained has its limit, and that the practice of exercising a change of diet is a good one. (3) The effect of brewers' grains in the yield is not confined to the earlier period of lactation. By a judicious use of brewers' grains such lactation period might be considerably extended. (4) The evidence of the experiments with regard to the percentage of fat in the milk seems conclusive that so far as the daily average of fat is concerned brewers' grains in moderate quantities produce in the long run no appreciable diminution of fat. (5) Although the average daily yield of butter-fat is not appreciably affected by a moderate quantity of grains, the percentage of butter-fat in the morning's milk does seem to be lowered more frequently. Having regard to this fact and the 3 per cent. standard, where the mixed milk of a herd of cows is habitually low in the mornings, brewer's grains are not to be recommended. (6) It must also be borne in mind that the above conclusions are based on results obtained by feeding brewers' grains in moderate quantities only and with a good complement of artificial foodstuffs. (7) In

these experiments no effect was produced by the brewers' grains on the non-fatty solids. (8) So far as the effect in the live-weight of the cattle is concerned the results are in no way very marked. (9) With ordinary dairy cows, which are kept as breeding stock, brewers' grains in moderate quantities may be safely used as food when the stock are otherwise well fed.

Investigations were conducted, also, to show the possibility of transferring boric acid from cattle food to cows' milk. The main question, "Can boric acid get into milk as the result of feeding cows on food containing boric acid?" is answered in the affirmative. However, the amount of boric acid that can get into the milk from food is small and could not possibly enable the milk to keep sweet for a longer time. As milk needs $\frac{1}{2}$ per cent. boric acid to produce any useful preservative influence, there seems no difficulty in distinguishing between milk preserved with boric acid and milk contaminated by the use of foods containing boric acid. If milk is found to contain more than 0.1 per cent. boric acid, the milk has probably been deliberately preserved with some boric preservative, but if less than 0.01 per cent. boric acid be found in the milk, the source of that small amount of boric acid is to be looked for in the food of the cow; whilst if between .1 per cent. and 0.1 per cent. boric acid be found, the origin of the boric acid is uncertain. With small amounts of boric acid in the food about one-sixtieth part of the total amount of boric acid fed finds its way into the milk.

Inter-Colonial Agricultural Union.

During the present month the Inter-Colonial Agricultural Union held their fifth annual Conference, at Durban. The Conference may be described as a great success, and some good work was done. A full report of the first part of the proceedings will be found in the present issue of the *Journal*, the balance being held over for the next issue owing to other demands upon our space. After the ordinary business of the Conference was over the delegates paid visits to the South African Fertilisers Company's factory and the Natal Mill and Elevator Company's works, at Umbilo, Kynoch's factory at Umbogintwini, the Harbour and Whaling Station at Durban, and the sugar farms at Amatilkulu (the latter by special invitation of the Minister of Agriculture), and were much interested in all they saw. Three interesting papers were also read, by Mr. P. J. du Toit (the Cape Under Secretary for Agriculture) on Agricultural Statistics (which we publish in the present issue of the *Journal*), by Dr. Wm. Macdonald (of the Transvaal Department of Agriculture) on Dry Farming, and by Col. H. Watkins-Pitchford (Natal Government Bacteriologist) on the Breeding of Army Remounts (which will appear in the next issue of the *Journal*).

We take this opportunity of offering to Mr. E. W. Evans, the President of the Natal Agricultural Union, our congratulations on his election as President of the Inter-Colonial Agricultural Union. Mr. Evans is an indefatigable and conscientious worker and has already done much good work for Natal; and the Inter-Colonial Union is to be congratulated upon its choice of president as the Natal Union is to be congratulated upon the honour of providing that president. Speaking of the election of president recalls to our mind the discussion which took place upon the necessity for reorganising the Inter-Colonial Agricultural Union, in view of the impending political changes in South Africa—the conversion of the separate “Colonies” into “provinces” and the political amalgamation thereof. A committee was eventually appointed to go into the matter and report as to what constitutional changes were necessary or advisable. During the discussion a reference was made, *inter alia*, to the need for changing the name of the Union, since, after next year, it will obviously be impossible to continue to style it the “Inter-Colonial” Union. A name which suggests itself to us is “The South African Agricultural Union,” which is comprehensive and at the same time less clumsy than either “Inter-Colonial” or “Inter-Provincial Agricultural Union of South Africa.” The Inter-Colonial Agricultural Union is destined to play an even more important part in the New South Africa than it has done in the past, as an advisory body for the Union Government and as the champion of the interests of agricultural South Africa. It has done splendid work in the past; in the future its work will be even more beneficial to the country by reason of the centralisation of Government and the better position in which that Central Government will be to act in the interests of the whole of South Africa than a number of independent Administrations can possibly be.

Epizootic Lymphangitis.

The outbreak of epizootic lymphangitis among the Government mules, which broke out about the time we went to press with our last issue, has filled the minds of many with apprehension as to the extent to which the disease will spread, and with misgivings as regards the possibilities of their getting their produce to the railway. In our next issue we shall have an article on the disease from the pen of the Chief of the Veterinary Division, Mr. W. M. Power, which will doubtless be read with much interest. It may be as well here to state that this outbreak of lymphangitis is confined to the transport animals only, and has no reference whatever to the mules recently imported by the Government for sale to farmers. These latter mules are a splendid lot of animals, and are quite free from disease, epizootic lymphangitis or otherwise; as a matter of fact they have not been anywhere near the affected

transport animals, these being isolated on a farm north of Maritzburg, while the imported mules went straight to a farm at Manderston after they had passed a veterinary examination at the port. Further, no other animals are allowed on the farms at Manderston and Mooi River where the imported mules are running. We publish this assurance in order to ease the minds of any who may have doubts as to the extent of the outbreak of lymphangitis among the transport animals and as to whether any of the imported mules have come in contact with animals belonging to the Transport Department. As we announced in our last issue, applications are now being received by the Director of Transport for these imported mules, and we would advise all who are desirous of securing animals to make early application for the same. The exact prices have not yet been fixed, but it is probable that the Department will be in a position to make a pronouncement on the subject shortly.

Maize Meal: English Appreciation.

The Herald of the Golden Age has the following interesting remarks to offer relative to the value of mealie meal as a human food:—"The recent introduction of such an excellent product as Natal maize meal into this country is worthy of notice as it has no superior and few equals among the maize crops of the world. For use as porridge it is said to stand unrivalled, being less heating in summer weather than oatmeal, while it makes a most palatable bread, used in the proportion of two parts of maize meal to one of flour. If it is possible to import it in a sufficient quantity, it will effect a reduction of one penny in the four pound loaf so prepared, while the nutritive quality of the bread will be greatly enhanced. The magnificent physique of the Zulu and Basuto races is a striking testimony to its nourishing and sustaining properties. The Zulus are the finest specimens of the Bantu race; and this meal, cooked as porridge with salt and water, constitutes their staple diet. In their natural state the Zulu and Natal natives are children of Nature, and it is only when they indulge in flesh-food and intoxicants that they become savages. When seen at their kraals, where they cast European habiliments and civilisation to the winds, no better physical specimens of humanity than the natives of this country can be found among the dark races of the globe. To exemplify the value of maize meal as a body-building food, it may be mentioned that some time ago twenty-three natives were, owing to a fall of rock, entombed in a Johannesburg mine for a period of eight days, and notwithstanding the fact that they had been without food during this time, they emerged from their prison singing and displaying the greatest activity at the joy of their release. This is a capital example of the reserve force resulting from a non-flesh diet. How many of our meat-eating British miners would be in such a condition after a similar imprisonment and fast?

"M. Escoffier, the famous Carlton House chef, states that 'the results obtained after various culinary preparations are perfect,' and have convinced him that 'Natal maize meal constitutes a healthy, fortifying, and agreeable nourishment, easily digested.' It can be used with great advantage for puddings, soups, cakes and biscuits, as well as porridge and bread, and is an admirable food for children. It should, therefore, be of interest to all those who are interested in food reform. By the courtesy of Mr. Harrison, Natal Government Agency, who kindly placed samples of the meal at our disposal, our secretaries have been able to distribute the same to callers at our offices, and they seem unanimous in its praise. The London County Council are experimenting with the meal, and propose to use it for the feeding of the poor children in their schools. In addition to benefiting the farmer, the Natal Government, who are using every endeavour to find their Colony's maize meal a permanent market in Europe, will also confer great benefit upon this country by introducing such a useful article of food. Should the South African farmers receive a sufficient demand, it will encourage them to largely increase the area of the cultivation of the maize, for which the climate and soil of South Africa are so uniquely adapted. The first consignments will be on the market during this month, and as the initial shipments will probably be limited in quantity, those who wish to secure the meal should take the first opportunity of doing so. Information on the subject, and hints in regard to its preparation for food, will gladly be given by Natal's energetic Commercial Agent, Mr. C. W. Francis Harrison, 26, Victoria Street, London, S.W."

East Coast Fever Notes.

The Minister of Agriculture has declared the zone marked off with flags in the Ixopo Division, on the south of the fence recently erected between Location No. 7 and the Mission Reserve, to be a zone within the meaning of the East Coast Fever Act No. 32, 1903, thereby prohibiting any cattle from entering or being in such zone.

The following regulation has been made by His Excellency the Administrator in Council under the provisions of Section 16, Act 32, 1903:—"Officers appointed by Government or by the Veterinary Department in connection with the administration of the East Coast Fever Acts shall be required to perform such duties and to carry out such instructions as may be given to them by their superior officers. They shall have authority to convey any orders made under, and generally to carry out the requirements of, the East Coast Fever Acts and regulations within the scope of their employment; and they may enter upon any lands for the purpose of carrying out their duties."

The following additional regulations for the appointment of Advisory Committees under the East Coast Fever Act No. 54, 1906, have been made by His Excellency the Administrator in Council:—(1) If at any time there is no Advisory Committee for a Magisterial Division or for any district, whether owing to the failure to elect a committee under the rules dated 20th January, 1908, and published under Government Notice No. 352, 1908, or to the resignation of members, or any other cause, or if the Minister finds that owing to vacancies or the unwillingness of members to act any committee is unable to properly exercise its functions, the Governor may, upon his recommendation, appoint a committee. (2) A committee so appointed shall enjoy all the rights and exercise all the authority of a committee elected under the rules of 20th June, 1908, and shall supersede any elected committee whose functions have gone into abeyance as aforesaid. (3) The Governor may at any time dissolve a committee appointed under these rules in order that a committee may be elected under the rules of 20th June, 1908.

Calcium Cyanamide.

In 1895, Frank & Caro laid the foundations of an important industry by discovering that barium or calcium carbide absorbs nitrogen at a temperature of 800 degrees, and is converted into a cyanamide. The cyanamide thus produced is a useful nitrogenous manure of the same class as ammonium sulphate, but has the further advantage of adding a calcium compound to the soil. In a recent issue of the Bulletin de la Société d'Encouragement pour l'Industrie Nationale, M. Pluinage discusses the cyanamide industry of France, and the article is translated by *Nature* and published in its issue of the 19th August. Cyanamide, the writer states, is made in France at the village of Notre Dame de Briançon, near Montiers (Savoie). Abundant water-power is available, and is, of course, an essential condition for the success of the industry. At the power station there are now three turbines of 2,200 h.p., but provision is made for more when necessary; these produce a three-phase current of 15,000 volts, which is conducted a distance of 11 km. to the factory. There it is transformed; part is used for making calcium carbide, and part for making cyanamide. The calcium carbide obtained has a purity of 80.5 per cent., estimated with sufficient accuracy by measuring the volume of gas evolved on treatment with water.

The calcium carbide is broken up and placed in an electric furnace, about 300 kilos. forming the charge. It is raised to a high temperature in presence of a stream of nitrogen; the operation may last from eighteen to fifty-six hours. The resulting hard mass is then reduced to a fine powder. The daily production

could readily be doubled. It is estimated that 2 tons of carbide can be produced per kilowatt per year, and that 2 tons of carbide combine with 500 kilos. of nitrogen. Two grades of cyanamide are sold—one containing 15 per cent of nitrogen, *i.e.*, the quantity present in nitrate of soda, the other containing 20 per cent., the quantity present in sulphate of ammonia. The latter grade also contains 20 per cent. of lime, 7 to 8 per cent. of silica, oxides of iron and aluminium, and 14 per cent. of free carbon, to which the dark colour is due. When added to the soil it is rapidly decomposed by bacteria to form calcium carbonate and ammonia. The ammonia is then nitrified and taken up by plants.

Direct field trials to ascertain its manurial value were first made in 1901 by Gerlach & Wagner, and have since been repeated in other countries. All experiments prove its value, and show that it is comparable in its effects with sulphate of ammonia. It should be applied before sowing, and may be mixed with basic slag or potassic manures, but not with superphosphates. The dressing recommended is $2\frac{3}{4}$ cwt., to $4\frac{1}{2}$ cwt. per acre, the smaller dressing for cereals, the higher for potatoes and beets.

Cape Border Ports of Entry.

Farmers and others living near the Cape-Natal Border, or concerned in over-border trade, will doubtless be interested to learn that the Cape Authorities have withdrawn Proclamations Nos. 319 and 351 of 1909, defining the Ports of Entry on the Cape-Natal Border for the introduction into Cape Colony from Natal of certain livestock and goods, and have substituted another therefor (No. 373, 1909), under date 27th August. This new Proclamation provides that "the Ports of Entry enumerated in the schedule hereto [reproduced at the end of this note.—Ed.] shall be the sole Ports of Entry on the Cape Colony-Natal Border for the admission into this Colony from Natal, in the manner described in such schedule, of human being, live stock and the articles or things specified in regard to each Port respectively, provided that up to the 2nd September, 1909, it shall be lawful to admit animals and traffic in terms of the provisions of Proclamations Nos. 319 and 351 of 1909, in cases in which the Resident Magistrate of the district concerned is satisfied that the said animals or traffic were actually *en route* prior to the issue of this Proclamation." It is further provided that "Nothing in this Proclamation contained shall be deemed to affect the validity of the prohibition imposed by my Proclamation No. 116, dated 12th March, 1909, on the introduction of vehicles and goods drawn to the said Border by horned cattle through the Ports of Entry at Stanford's Drift and Union Bridge, or of the restrictions imposed by my Proclamation No. 528 of the 25th November, 1908, on the introduction of sheep and goats into East Griqualand."

The Proclamation proceeds: "Notwithstanding anything to the contrary contained in Proclamation No. 187 of 1889, as amended by Proclamation No. 428 of 1908, it shall not be lawful for any person, without the authority of the Minister previously obtained, to pass through or over any of the fences erected along the Natal Border from the Drakensberg to the mouth of the Umtamvuna River, except through the Ports of Entry enumerated in the schedule hereto, or over a stile, and, in the latter case, only for the sole purpose of procuring water from the Ingwangwane, Indowana, Umzimkulu or Umtamvuna Rivers, and further, that all persons crossing such stiles, or entering through the Ports of Entry aforesaid, shall be liable, when so required by the officer or non-commissioned officer in charge of the Cape Mounted Riflemen or Guard acting under his orders, to be searched and examined for the possession of any article or thing, the introduction whereof into this Colony from Natal is or may hereafter be specially prohibited. Any person contravening the provisions of this Proclamation shall be liable, on convictions, to a fine not exceeding fifty pounds, or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months, unless such fine be sooner paid."

The following is the schedule referred to in the proclamation:—
PORTS OF ENTRY INTO EAST GRIQUALAND.—(1) *Stanford's Drift*: For human beings, equines used solely for transport purposes, sheep and goats, and all articles or things whereof the introduction is not specially prohibited. (2) *Riverside*: By rail only, for all live stock other than cattle, sheep and goats, and all articles or things whereof the introduction is not specially prohibited, and which are not conveyed in cattle trucks, and also for human being, and equine transport used solely for the conveyance of passengers and their personal effects. (3) *Union Bridge*: For human beings, all livestock, other than cattle, and all articles or things whereof the introduction is not specially prohibited, provided they are not removed beyond the boundaries of the district of Umzimkulu, Ingeli Gate and Harding Gate, for human beings and articles or things whereof the introduction is not specially prohibited.—**PORTS OF ENTRY INTO PONDOLAND.**—*Middledrift*: For mail bags only, under the supervision of the Border Guard, provided that up to the 2nd September, 1909, human beings, with their personal effects, not being prohibited articles, may be admitted through Middledrift and Webster's Drift. [N.B.—Prohibited articles or things comprise animal produce, grass, hay, reeds, rushes, herbs, plants or other vegetable matter, but do not include vegetables, fruit, cereals, or cultivated plants, provided such are not packed in grass, hay, reeds or rushes.]

Some Aids to Irrigation.

By PROFESSOR HENRY PAYNE, M.Inst., C.E., M.I.M.E.

(A Paper read at the Robertson Irrigation Congress, C.C.)

IRRIGATION has been defined as "the systematic application of water to land in order to promote vegetation." If we analyse this definition we see how very comprehensive it is, including—as it does—under the expression "systematic application," the work of the engineer in bringing water to the farm and the work of the farmer in applying it scientifically to the soil for the purpose of promoting vegetation. Four of the main points to be borne in mind when considering water supplied for irrigation purposes are—conservation, distribution, percolation, and evaporation. The streams forming our rivers rely almost solely upon the rainfall, for we have no perennial snows which by their melting will maintain the flow in summer; and since the usual nature of the catchment is barren—owing to the destruction of bush and the constant burning of the grass just prior to the advent of rain—there is little to impede the run-off. If rivers which flowed at a uniform rate existed in this country, the problem of irrigation would be comparatively simple; but South African rivers are intermittent, varying not only from month to month, but also with wide annual variations even in successive years. So that if irrigation, on a big scale, is to be a certainty throughout the year and from year to year, recourse must be had to the surplus of flood water, and means adopted for its conservation on a scale commensurate with the magnitude of any particular scheme. To obtain at least a uniform minimum amount of water throughout the year large storage dams must be constructed if full advantage is to be taken of the rainfall. The construction of such reservoirs should not prove impossible in most parts of the Colony, for it has lately been put on record that "there is no lack of sites for large storage reservoirs."

IRRIGATION FROM STREAMS.

Irrigation from streams—apart from storage on a large scale—has its limits. For instance, a canal or furrow will only have water during certain months of the year, and this at a time when in all probability the land also is receiving a certain amount of rain. Now, if during the months of heavy rainfall the excess were stored, then the dry season would be adequately provided for, but if storage be not available, a time is sure to come when agriculture will suffer from lack of supply during a period when water is wanted; the only means to overcome this serious

deficiency is to provide adequate storage by the construction of large dams. Up to the present, conservation of water has played no important part in overcoming times of drought in this country. In making this statement, it is not intended to underestimate the value of the individual farmer's dam, but rather to suggest that the storage should be on a scale in proportion to the requirements of the district, the absolute necessity for which will, in all probability, not be fully realised until a season of continued drought comes with its severe practical lesson. For examples of the foregoing point I will first refer to the Nuy and Nonna Rivers and then to the Breede River. The Nuy River irrigation scheme has a weir and measuring device at the entrance of the canal and intake of the pipe line, while the Nonna River scheme has a weir and small reservoir at the intake of its pipe lines; neither scheme has adequate storage. It is true that by means of private storage dams at the farms, the farmers participating in these enterprises have partially guarded themselves against long spells of dry weather, and have added to the value of their property, but to fully develop the properties served by these works far more conservation must be provided than has at present been accomplished. From the lie of the country this should be possible at a reasonable cost. If storage dams be constructed, then more valuable crops could be grown, as water will then be available, not only at the time of the rains, but also during periods of shortage of rainfall, thus benefiting the whole of the lands served by the schemes; some portions of which would otherwise be very indifferently supplied with water. Coming now to the larger example of the Breede River, we find that, generally speaking, for two or three months of the average year little or no flow takes place, while at other periods a very large body of flood water spills over the weir, and thence down the channel to the sea. The rainfall distribution diagram for Ceres shows the variations which occur, and which may—in a measure—be taken as an indication of the river's discharge. When one takes into account the fact that with small rainfall little or no run-off takes place, and that, broadly speaking, the more intense the precipitation on the catchment, the greater is the percentage of the run-off, we see that the fluctuations of flow in the Breede River may be even more eccentric than those of the rainfall as shown on the diagram.

NECESSITY FOR STORAGE.

In an early report of the proposed Ashton Canal, we find that the necessity for storage is emphasised, if it be obtainable at a reasonable cost, as it would enormously enhance the value of the scheme by assuring the supply. The discovery of a suitable site for a dam at Kluitjes Kraal removed the last vestige of doubt which might have existed in regard to the success of the scheme. This dam, if constructed, would store from 1,500 to 2,000 million cubic feet of water, which, if distributed over a

dry season of, say, four months, would allow of at least two waterings, each of three inches depth, over 50,000 acres; this would include not only land to be brought under irrigation by the proposed canal, but also that served by existing schemes. Thus agriculture would be materially assisted during the summer months, when Nature would be most active; for instance, lucerne could be cut with greater frequency, with a correspondingly big return per acre. Large storage dams for flood waters not only aid the flow of streams from which irrigation canals are taken, but can also be built in situations to catch the run-off in the upper reaches of the dry river beds, so common in this country. Such rivers may have water in the rain district, but they soon peter out before covering many miles of the thirsty soil traversed. Storage reservoirs will here enable the intermittent water supply to be more profitably dealt with than merely as flood waters, and the water thus available will ensure at least one crop per season being brought to maturity, where previously it would have been impossible to do more than start the growth. A dam in such a position may become dry, but its existence will still be justified, in that it will shorten any period of drought by more effectively distributing the run-off from the intermittent rainfall, thus directly benefiting the farmer. The fixing of a site for a dam necessitates the making of careful investigations by competent engineers, for with the proper choice of site much money may be saved. The selection of the site for the Vyrnwy dam, built in connection with the Liverpool water supply, affords a striking illustration of this point, for had it been shifted only some 200 yards up or down, it would have entailed additional expense of from £300,000 to £400,000. Preliminary borings at the site of a proposed dam, although seeming so useless to the lay mind, will determine the adoption or rejection of a site, as these boreholes show not only the character of the foundation, but also whether or no a natural drain exists below the foundations, which may not be apparent from the geological study of the surface deposits.

CO-OPERATION INDISPENSABLE.

Co-operation is indispensable for the construction of large storage dams, not merely because of the expense, but also because the only available site for the dam may be on one farm, whilst the best lands that would be served by the scheme belong to adjoining farms. As the collection of statistics of rainfall and run-off are immensely important when determining the size of any irrigation project, may I put in a plea for greater practical individual interest in connection with the systematic recording of rain gauges and the measurement of streams. To accurately measure flowing water is not an easy task, and is therefore usually left to the engineer, but as success or failure of irrigation schemes or of particular crops may depend upon the quantity of water supplied or used, I will briefly touch upon measurement of water, as it should play an im-

portant part in all matters of distribution. The types of notched gauges for determining the discharge of streams as recommended by the Irrigation Department, are illustrated on the accompanying diagrams. The method of gauging the velocity of a stream by means of timing the passage of a float over a given length is probably the only one by which farmers measure the flow in their furrows, care being taken to choose a part of the furrow which is both straight and uniform for some 50 feet. Now, it often happens that this apparently simple condition is not so easy to find in practice. I will therefore draw your attention to a little device for measuring the surface velocity, which is based upon the fact that if a small obstruction be put into a stream, a ripple will form, and when two obstructions are placed side by side a short distance apart, two ripples will result, which will interest one another at a point downstream, the distance from the intersection of the ripples to the line joining the obstructions provides the measure of the surface velocity of the stream; the limiting condition is that no ripple will form until the velocity exceeds nine inches per second. The extreme simplicity of applying the idea induced me to construct this small ripple-producing apparatus for the measurement of velocity; it consists of two ordinary 3-inch wire nails placed 4 inches apart on a connecting piece, through which a rod passes for determining the length of ripple. If L be the distance in inches from the intersection of the ripples to the line adjoining the nail centres, and V be the required surface velocity in feet per second, then V equals 0.40 plus $0.28 L$, a range of some 12 inches being sufficient for determining velocities from $\frac{3}{4}$ to 4 feet per second. With this apparatus for determining the surface velocity, it is only necessary to obtain the cross-section of the stream bed or furrow at the place of measurement, which can be found with greater reliability than the cross-section required for the 50 feet length in connection with the float method of measurement. The float is not altogether a satisfactory device, as it is apt to travel to the bank with the slightest breeze present on the water surface; especially is this the case in small furrows, whereas the ripple is merely slightly twisted by a breeze in the short length under observation.

QUANTITIES OF WATER.

It should be the object of every cultivator to know the quantities of water required for particular crops, as there is usually a figure which will give a maximum return of crop for a given quantity of water; this, no doubt, varies with the character of the soil, there being a narrow range between excess and deficiency. If excess of water be applied to land then there is the danger of reducing the soluble plant foods in the soil, since these will be carried away with the seepage water. If, on the other hand, too little water be applied, and the water in suspension in the soil be reduced to from 5 to 10 per cent. by weight, it will yield none to the

plant, and the struggle for existence of the plant may prove fatal. There is a saying that one cannot apply too much water to land provided drainage be adequate. This may be the case in exceptional instances, but usually after a time the farmer who applies too much water will find deterioration of plant life due to removal of the soluble plant foods, and will have to pay for it indirectly by the purchase of manures earlier than otherwise, besides having to pay for the excess of water used by him, in that he is not bringing as much land under irrigation as would be possible with his supply. The amount of watering required for any particular soil can be most easily obtained by noting to what depth a quiet, steady rain has penetrated for the corresponding number of inches of rainfall; and when irrigating the soil the same number of inches of watering, if uniformly distributed, will be needed, if the required depth of penetration has to be the same as that due to the steady rain; or if the depth required be more or less, then the number of inches of watering will be increased or diminished correspondingly. It should be borne in mind that 1 cusec (cubic foot of water per second) will give a 3-inch watering on one acre in three hours, and thus the depth to which such a watering will uniformly penetrate can readily be found for the soil under observation. The laying out of an irrigation scheme should always be accompanied with a drainage system, so that no such condition as absolute standing water should be present in the soil. The drainage being laid so that any seepage water will be either returned to the stream lower down or be available for lower lying lands. The percolation of water downwards and outwards may occupy long periods, and seepage not show itself for some years after the commencement of irrigation. The supply should be regulated so that the high levels of the farm can be watered direct from the channel from the day supply, while the night supply alone should be stored in the farm dams and be utilised for the lower lands.

EVAPORATION.

Coming now to evaporation, the chief agents are heat and wind, the former aids whilst the latter retards growth. Evaporation is largely due to wind playing over the surface of land and water. On the accompanying diagram I have shown the evaporation which takes place on a water surface—in terms of that taking place during calm under the same conditions of temperature and humidity—against the corresponding velocity of wind; it will be seen that even the light breezes have very considerable evaporative power. The surface of the land dries under the action of the wind, shelter from which minimises evaporation and reduces transpiration from the leaves of plants, thus reducing the amount of water necessary for sustaining their life. Protection can be effected by aid of shelter belts, which may consist of trees, shrub, or hedge. For every foot height of a shelter belt 12 feet on the leeward side

fall within the protected zone, so that a hedge 8 feet high will protect about 100 feet of surface against wind action. The direct benefit of shelter belts, beside minimising evaporation from the soil, are the protection of plant and animal life from hot, dry and cold winds, and even from frost; livestock will also be guarded from dust storms, and are afforded shade. Some indirect benefits from the growth of shelter belts are a supply of fuel and poles, a possibility of planting orchards in positions which would otherwise be too exposed, and an increase in the value of the land. Service dams should always be guarded against evaporation due to wind. This may be carried out by providing a sufficiently high bank above the water surface. In conclusion, I would impress upon you the need for the scientific utilisation of water in irrigation; it will repay any additional attention involved, and will carry with it prosperity to the community.

Better kill the inferior stock than your reputation by trying to sell them.

When you purchase new fowls, keep them to themselves until you are sure they are free from disease and lice.

HOW TO EXAMINE A SICK ANIMAL.—First take the temperature of the animal by placing a fever thermometer into the rectum, allowing it to remain there from three to five minutes. The normal temperature of a cow is 101 degrees (Fahrenheit). The normal temperature of a horse is 100 degrees; sheep 101 degrees. Second, take the pulse of the animal, which can be found at the angle of the lower jaw bone. The normal beats of a cow's pulse is from forty to fifty per minute, and that of a horse from thirty-three to forty per minute. Third, count the respirations of the animal, or number of times it breathes by watching the sides or flanks, or by pressing the ear to the side. The normal respiration of the cow is from fifteen to twenty per minute, and that of a horse is from twelve to fifteen per minute while resting. If the temperature, pulse, or respirations are found to be higher or faster than above described you will know that the animal is ailing.—*Journal of the Jamaica Agricultural Society.*

Co-operative Bacon Curing.

By LOUDON M. DOUGLAS,

Lecturer on the Meat Industry, Edinburgh and East of Scotland College of Agriculture.

CO-OPERATION was instrumental in causing a rapid development of the bacon industry in Denmark, but there has been no similar extension in the United Kingdom, and it is only recently that British farmers have begun to consider the possibility of applying co-operation to the bacon industry in the United Kingdom. The first Farmers' Co-operative Bacon Factory was inaugurated at Roscrea, in Co. Tipperary, Ireland, in January, 1908, and it was able, under adverse circumstances, to show a successful record in its first year. The Roscrea Factory has a nominal capital of £15,000, of which rather less than £12,000 was subscribed, about £7,000 being absorbed for the site, buildings, and machinery. The initial expenditure on these items left a little over £4,000 for working capital. Experience showed that this was too little, and that the working capital of such a factory, having a capacity of about 750 pigs per week, should be at least £10,000. With a sufficient capital success may be assured, as by modern methods it is possible to realise high prices for home-cured bacon, and at the same time to utilise all the by-products which arise in such a factory.

FORMING A CO-OPERATIVE SOCIETY.

No better example of the methods necessary for the formation of a co-operative society could be given than the Roscrea Bacon Factory. The shareholders in this factory consist of some 2,800 members, the majority of whom are small farmers. At the commencement, when the subject of a co-operative bacon factory was discussed, a provisional committee was formed, and under its guidance the whole of the district was canvassed for support, and this support was freely given, so that the number of shareholders reached the large figure mentioned. The society was then registered under the Friendly Societies Acts, and shares were issued at £1 each. Subsequently the provisional committee elected a directorate, and they carry on the factory in much the same way as in the case of a joint stock company.

The principal difficulty in such a factory arises from the inability to guarantee a constant supply of pigs, and this was met by the subscribers being asked to sign a guarantee under a penalty that they would supply all their pigs, of the weights required in the bacon trade, to the Roscrea Bacon Factory. This was intended to defeat any unfair

attempt to induce farmers to sell their pigs at intentionally enhanced prices to other bacon factories. As a matter of fact, such attempts were really made, but it is to the credit of the Roserea shareholders that they refused to accept any such offers.

In fixing upon a site for a bacon factory it is well to bear in mind that it is usually in dairying districts that large numbers of pigs are available. The modern method of pig-feeding has shown that a combination of separated milk and cereals is by far the best fattening material, and the future of the bacon curing industry is, therefore, to a large extent in the hands of dairy farmers.

THE BREED OF PIGS.

The first care is the breed of pigs. There are in the United Kingdom six well-known breeds which lend themselves to bacon curing. These are:—(1) Large White Yorkshire, (2) Middle White Yorkshire, (3) Berkshire, (4) Tamworth, (5) Large Black Suffolk, (6) Large Black Sussex; and, of these, the most useful for bacon curing purposes are the Yorkshire and Berkshire breeds. For crossing purposes, however, the others are of considerable value, and it must be remembered that a pure breed of pigs is not wanted by the bacon curer. What he wants is the bacon pig, and this is an animal which does not belong to any particular breed.

A bacon pig should mature in about seven months, and it should turn the scale, "dead weight," at about 12 stone, or 168 lb. This size represents a live weight of from 15½ to 16 stone, and may generally be regarded as fetching the highest price for bacon curing purposes. Smaller pigs which are used for various sections of the trade, such as the making of hams and middles, may be in demand in certain localities, as heavier pigs may also be in demand; but on the average these will be wanted in small numbers.

THE CONSTRUCTION OF A FACTORY.

When a co-operative society has been formed the first business will be to arrange for the construction of the bacon factory, and it will be found that, in comparison with the older factories, it is possible to construct a modern building very much more cheaply than was at one time the case. It was considered essential in the early days of bacon curing that there should be strong, thick walls around the factory. This notion, however, has been abandoned, and factories built for the most part of corrugated iron are likely to be more common than any other type in the future. In such a factory the construction can be so arranged as to lend itself easily to extension, if necessary, at any time. The main structure need not be expensive; corrugated iron is quite good enough for the roof and sides. In so far as the cellar,

chill room, and engine rooms are concerned, these can advantageously be constructed of concrete walls, with hollow spaces, or built with concrete bricks or slabs with hollow centres.

The general arrangement throughout is that, as far as possible, one department follows the other in sequence, the object to be kept in view being to minimise the labour in connection with the cycle of operations.

It has been found that the best form of factory is such as would be contained within a rectangular space, and in two of the most modern factories—*i.e.*, at Roscrea in Tipperary, and Dunmow in Essex—this design has been followed with the best possible results. Perhaps the best method of understanding the construction referred to will be to follow the operations through a modern factory.

OPERATIONS IN A MODERN BACON FACTORY.

The pigs are landed on a receiving platform, where they are first of all weighed by the live weight, and suppliers can be paid on that weight at once, if they so desire. If, however, they prefer to receive payment on the "dead" weight, this is ascertained usually the day following that upon which the live pigs have been received: The dead weight averages about 25 per cent. less than the live weight.

After being weighed the pigs are driven into the sties, where they are allowed to remain overnight, and the slaughtering is usually carried out in the morning. They are driven, one by one, into the catching pen, where they are shackled, or caught up by means of leg chains, a running noose being formed by means of the chain being slipped through a ring, and the noose thus made is passed over one of the hind feet. This chain is then attached to a hook at the end of a steel rope, which is governed by a hand or power hoist. By this means the animals are hoisted to an overhead bar, and, when they are in position, are slaughtered, the blood being let out very quickly by the insertion of a knife in the direction of the heart. From the time of the live animals entering to the moment the carcasses are suspended lifeless is not more than one minute, so that in the modern factory this operation is very expeditious.

The carcasses are pushed along the overhead bar to the bleeding passage, and are allowed to hang there some little time, after which they are pushed off the bar on to a dumping table. This dumping table forms part of what is known as a "Slaughtering Tack," which is the main part of a pig abattoir. While on the dumping table the leg chains are removed, and the carcasses are then rolled into a rectangular scalding vat, capable of holding some five pigs at once. This vat is partially filled with water at a temperature of about 180 deg. F., and the carcasses are turned round and round in this bath until the hair

becomes loose. They are then, one by one, tilted on to a scuttling table, where they are scraped almost free from hair.

A hook is then inserted in the apex of the lower jaw, and the animals are suspended to a track bar, head upwards. They are pushed along this bar until they come under the opening of a vertical singeing furnace, which is so constructed that the carcase of the pig may be hoisted through a circular fire, and in this way the whole carcase is burned or singed. This operation takes only a quarter of a minute, and the burnt carcase is again lowered to the track bar, when it presents a very black and shrivelled appearance. This burning, however, is a great advantage for Wiltshire bacon, inasmuch as it imparts a particularly piquant flavour to the meat. The fact, also, that the fat underneath the skin is momentarily melted is also an advantage, as in subsequent operations it becomes firmer than it would otherwise be.

After leaving the singeing furnace the carcasses are thrown into a cold-water bath, and are cooled, after which the sinews of the hind feet are exposed and a gambrel inserted, so as to spread the hind feet apart.

By means of the gambrel the carcasses are then hoisted on to a track bar, and are scraped quite clean and washed. The intestinal and general offal is then removed and taken to a separate apartment, where the different portions are assorted for various uses.

The flake lard is always left with the carcase, and is weighed in together with the head and feet, so as to form the "dead weight," which is sometimes taken while the carcase is warm, and at other times is ascertained after the excess of animal heat has dissipated. When the carcase is weighed in the warm condition an allowance of four pounds is made for loss of weight in cooling. Cooling in the open air, so as to allow of the dissipation of the excess of animal heat, usually occupies about six hours. After removing the offal and weighing the carcasses they are split up into sides. The head and forefeet are severed and the lard removed. It may be mentioned here that the head and feet are forthwith chilled and put into pickle to be cured.

THE CURING PROCESS.

The sides are pushed on into the hanging house, in case they have not already been allowed to hang, after which they are pushed along the track bar into the chill room, where they are kept at a temperature of 38 deg. F., until, on inserting a meat thermometer into the gammon end, it registers 40 deg. F. On the average it takes 36 hours to reach this degree of coolness, and when it has been attained the sides are taken into the curing cellar, where finally they are trimmed, and at once pumped with a recognised pickle in some fourteen different

places, after which they are laid down on the cellar floor and stacked in tiers 10 sides deep. The cellar is kept at a temperature of about 42 deg. F.

Each side is covered over, first of all, with an equal mixture of curing antiseptic and saltpetre, in a finely granulated state, and on the top of this is placed a thick layer of salt. For mild-cured bacon this is all the curing that is required, and in about fourteen days' time the process of curing is complete, after which the bacon is taken out and washed in cold water, and should then be in a state for selling as "green" bacon. If wanted as "dried" bacon it must be hung in a drying room for three days in a temperature of 90 deg. F., and is then available as "pale dried" bacon. If, however, it is wanted as "smoked" bacon it must be hung for three days in a smoke stove where the temperature does not exceed 90 deg. F., and where a thick volume of smoke is produced from hard wood sawdust, such as oak, ash, or beech.

These operations refer to what is technically known as "Wiltshire bacon," which is a commodity that is produced in all bacon curing countries. There are, however, many variations of the bacon curing trade, and also subsidiary operations, which in themselves are businesses, such as sausage-making and lard-refining. The products of a bacon factory may also include hams, middles, rolls of bacon, or other special products, but the processes of manufacture are only variations of the general principle of curing Wiltshire bacon. What is absolutely indispensable in the bacon factory is competent managership, and the employment of a staff who are acquainted with the various processes to be carried out.

A Bill to repeal the Income and Land Assessment Act of 1908 is to be introduced into the Legislative Assembly this Session by Mr. Hulett. Mr. Hulett is also introducing a Bill to amend Sub-section D of Section 15 of the Land and Agricultural Loan Fund Act, No. 27, of 1907. He proposes to add the following to the section in question after the word "Crown," viz.: ". . . and it shall not be necessary to register said lease in the Registrar of Deeds' office of the Colony in terms of Law No. 19, 1884, or of any other law requiring registration of leases, and any mortgage or pledge passed and registered in the Registrar of Deeds' office as security for said advance shall have the same effect as if the said lease had been registered."

Agricultural Statistics.

By P. J. DU TOIT,

Under Secretary for Agriculture, Cape Colony.

*(A Paper read at the Fifth Annual Conference of the Inter-Colonial
Agricultural Union of South Africa, Durban, 1909.)*

SUPERFICIALLY, agricultural statistics convey to the mind an array of figures laborious to wade through, but far more laborious to prepare. In reality there is to be found in agricultural statistics collected in detail and well presented a mass of suggestions as well as of facts—for those who are open to such impressions. Take up a volume such as, for example, the sister Union (or Commonwealth) of Australia issues, and the first thought that occurs to one is the enormous amount of work involved; indeed, one's admiration, one's high appreciation of the information afforded, are called forth. And it also suggests, strikingly, in what directions we can accomplish something in our own approaching Union.

Work begets work, and the more one does the more there is to be done. Therefore, we find invariably that labour well spent opens up many avenues for other work and in directions probably not intensioned. So with agricultural statistics. But still it might be asked: What is the essence of statistics? And the answer, I think, is simply, but weightily, this: Accurate knowledge, true conception. (When I use the word "accurate" in connection with statistics it is, of course, in an approximate sense.) The value of statistics also lies in their indicating the condition in which the national system is, and assisting to arrive at correct diagnoses of national ills; they afford means of leading commerce into right channels, of stimulating agricultural production, and of rectifying the misapplication of methods and energies.

Agricultural statistics have been compiled in South Africa in the past at long intervals or in a fitful manner. Strenuous competition, such as we have nowadays, demands thoroughness in detail and knowledge; and it is impossible for a country to hold its own by the slipshod methods based on guess work.

Let me consider one or two subjects in some detail in order to make my meaning clear.

South Africa is particularly interested in mealies at the present time and, I hope, for a long time to come.

	lbs.	lbs.
In 1908 the <i>Transvaal</i> produced . . .		287,567,000
Imported—		
Oversea	70,000	
S.A.P.	34,195,000	
		34,265,000
It therefore obtained by production and imports together		321,832,000
Of which it exported, oversea and to other S.A. Colonies		63,278,000
And approximately we may say it required, retained or used (I am not prepared to say which)		258,554,000

Now, in connection with this paper, we might notice two things particularly: the one is, that the *Transvaal* exported 63,000,000 lbs. of mealies, while it imported 34,000,000 lbs. in round figures. It has been said that it is wrong to export so much as to have again to import. That does not necessarily follow: in certain circumstances it may be wrong; in other cases it may be quite right. It depends upon trade relations, trade facilities, geographical position, etc.; and where a country both exports and imports an article it is generally the case that it pays it better to import from other countries, to a certain extent, than to exchange the article to that extent within its own borders. The second point we might notice is the quantity which the *Transvaal* itself required, retained or used. It does not follow that the *Transvaal* required or used the whole of the 250,000,000 lbs. which it retained. But it is necessary for commercial and other purposes to know how much a country requires for itself of a particular commodity; and this can be ascertained approximately by calculations of the nature indicated, spread over a series of years.

	lbs.	lbs.
In the same year <i>Cape Colony</i> produced (exclusive of the <i>Transkeian Territories</i>)		119,000,000
Imported—		
Oversea	5,987,000	
From other S.A. Colonies . .	123,574,000	
		129,561,000
It therefore obtained by production and imports (exclusive of the Native Territories mentioned)		248,561,000
Of which it exported (oversea) . .		9,819,000

We have, therefore, available for the Cape Colony proper the information which we have in respect of the Transvaal. But when we come to Natal, the O.R.C. and Crown Territories, we can give exports and imports but not production, and are left in the dark as to what the other parts of British S.A. require for themselves; with the result that trade may not be conducted on sound lines.

I have said that statistics are a means of stimulating production. We do not know the area under mealies and the average yield per acre, though on limited extents this latter has been calculated. We do not therefore know how our production per acre compares one year with another—whether it is greater or less one year than another, and cannot for this reason ascertain with any satisfaction what the variation is due to and what is required to be done to ameliorate the position. We cannot compare our production per acre with that of other countries; and, in short, we cannot do our duty by ourselves.

Let me next occupy your attention for a while on the question of meat, the exportation of which from Cape Colony, some people say, is at hand. Leaving out of account for present purposes the questions of cold storage, railway rates, artificial feeding, etc., it is known that on the 30th June last that Colony had over 23,000,000 small stock and that in the first six months of this year it exported to other S.A. Colonies 189,000. But we do not know how many are slaughtered for local consumption annually and how many are in fit condition at the present time for the market. When I tried about four years ago to ascertain whether that Colony had sufficient meat to feed itself without diminishing its breeding stock, I had to resort to intricate calculations of the percentage of stock usually sold by farmers, the quantity which the white rural population would consume, had to make a rough estimate of what the coloured rural population would consume, make extensive allowances for over-calculation, and come to conclusions which, one could not help feeling, were not convincing.

But we would have to go a great deal deeper than making up our minds that we shall have agricultural statistics. Much depends on the methods of collection and the form of presentation. I had hoped that by this time a conference would have been called of gentlemen representing the various British South African Colonies and Territories for the purpose of devising a system suitable to South Africa; but unfortunately efforts in this direction have not yet met with success. The volume of inter-colonial trade is so great that uniformity in the collection of agricultural statistics is absolutely necessary. It is a South African question. By far the larger part of the population that will enter the Union of South Africa is entirely uneducated; another large part, like in every other country, does not appreciate the value of statistics; and a comparatively small section could be relied on to be

workers in the cause if required. Weights and measurements, again, are woefully inaccurate: some yards are 2 ft. 3 in. long; some acres may almost be described by the definition of a line—length without breadth; and even when one comes to feet, it is always doubtful, in this country, whether they are English feet or Dutch feet. These are little difficulties, but little ones only. Because we have a large part of the population uneducated the collection of statistics would be comparatively expensive; and because so large a proportion of our population is not only indifferent to statistics, but even regards the enumerators with suspicion, it becomes necessary to devise a means of either overcoming or counteracting that state of mind. Now, one is naturally averse to the enactment of a law unless there is a strong need for it. Law is often only a necessary evil, tolerated because it is necessary. Law compels, and compulsion one instinctively revolts against, though there are a good few people ready and glad to invoke the aid of compulsion—for others. Still, I feel convinced that in the present state of our own social equipment a law on the subject is needed for this country if we are to have reliable statistics. This is the experience in Cape Colony, and I think I am safe to say that the circumstances which make this necessary in that Colony are present also in the other British South African Colonies and Territories.

I shall now give you briefly the systems obtaining in four other countries, and then indicate what I consider should be the system that South Africa should adopt.

In Great Britain the collection of annual statistics was commenced in 1866. This was a voluntary system, which has continued up to the present. The work has gradually expanded and developed to its present dimensions, which now include imports, exports, market prices of agricultural products and live stock, acreage and production of crops and distribution of live stock, and also gives a record of the main agricultural statistics of foreign countries for the sake of comparison. Estimates of crops and market reports are also furnished by a staff employed at the principal centres. The returns are compiled by the Board of Agriculture and Fisheries.

In the United States of America a comprehensive system is in vogue. The annual appropriation for the purpose is about £20,000. The work is conducted by a Bureau of Statistics, which is a branch of the Department of Agriculture. The Bureau again is divided into three divisions:—

- (1) The Division of Domestic Crop Reports;
- (2) The Division of Foreign Markets; and
- (3) The Miscellaneous Division.

The Division of Domestic Crop Reports compiles estimates of yields from reports received from salaried statistical agents, one of whom is located in each State, and from special field agents who travel

within and throughout two or more States, examining the crops in the field and securing information from all available sources, such as agricultural implement dealers, country merchants, representative farmers, and others.

The Division of Foreign Markets compiles information regarding imports and exports of the various farm products, and also of manufactured products. This division, in addition, makes comparisons with the conditions in countries which compete with the United States in the world's markets, and makes investigations in foreign countries to ascertain in what way the sale of American products can be extended.

In the Miscellaneous Division the clerical work of the Bureau, so far as the tabulation and compilation of the reports received are concerned, seems to be conducted.

With regard to part of the statistics, the system is a compulsory one, but the greater part of the information is obtained voluntarily.

In Australia there is a Bureau of Census and Statistics for the whole of the Commonwealth. Under the Census and Statistics Act of 1905 a Commonwealth Statistician was appointed. For many years past each of the States collected its own statistics, but under the Act quoted the collection is now uniform. As the title of the Act shows, the Bureau collects, in addition to agricultural statistics, vital, commercial, and industrial statistics as well. The system is a compulsory one, penalties being provided for not supplying the information asked for, for not answering the questions put by authorised officers, for refusing to permit authorised officers to enter factories, etc., for hindering or obstructing authorised officers, for giving wrong information, for altering a document without lawful authority, and for divulging information. The information collected is very full and complete.

In India the Agricultural Department in each Province obtains the agricultural statistics from its ambulatory staff, such as surveyors, etc. The information is of two kinds: (1) Preliminary, and (2) Definite and final. The preliminary information is based on estimates framed at intervals during the year of the areas under certain crops. Three such estimates are ordinarily prepared in the year, the first regarding the sowing—whether late or normal, whether extended or restricted, and what the seasonal conditions are. An intermediate estimate is given two months later of the progress of the crops, the seasonal features, and the probable yield. The third estimate is given when the crop has been reaped, but before the final report is made. Each department publishes these reports for its own Province, but a general summary is issued by the Statistical Department of the Government of India. While the preliminary estimates are limited to typical areas and districts, the final statistics include many crops not given in the preliminary estimates.

In South Africa fruit crops beginning with apricots and ending with citrus fruits ripen from December to about September. Cereals ripen from October to June. Animal products are, of course, perennial; and so on. We have at least three overlapping periods to deal with; but the most suitable year for this purpose is, I think, that running from 1st July to 30th June. I should divide the reports into four stages: First, quantities sown; second, progress reports as regards cereals about two months after sowing is completed with information as to the season; third, estimate of yield shortly before harvesting; fourth, actual production. As crops ripen at various times of the year, short returns should be issued from time to time dealing with the particular products then sown, maturing or won—*e.g.*, taking cereals, returns of sowing would be issued for oats, wheat, etc., at one time and for mealies and Kafir corn separately at another; progress reports would be published for deciduous fruit at certain months and for citrus fruit later in the year; harvest returns would be prepared for the various crops as soon as possible after they are reaped; and the whole of the actual, final returns would be included in a single volume.

The next question is—what field system should be employed? It is unfortunately necessary in South Africa to have sheep inspectors; and since we have to deplore the need for them, let us at least have the satisfaction of invoking their assistance in the furnishing of reports of the progress of crops and forecasts of yields. Their reports could be supplemented by voluntary reports from field cornets, veterinary surgeons, auctioneers, merchants, and others who frequently come into contact with agriculturists. Where sheep inspectors are not available enumerators would have to be specially appointed. For actual returns the mounted forces that do police duty are most conveniently at hand, supplemented where necessary by enumerators specially appointed.

Then there is the work of compilation and publication, and the questions as to which department should be responsible for that work; whether a Statistical Department should be established which would be responsible for statistics of all kinds—agricultural, industrial, commercial and vital—or whether different departments should supply different sections, the whole being arranged and edited by a central Statistical Department. But these are matters of administration, which need not be dealt with here.

Mr. Chairman and gentlemen, this is all I have to say now; but I hope the value of the subject will not be measured by the intrinsic worth of this paper. The work I have advocated—and there are many in this country who have urged its being taken in hand systematically—would be as broad in its effect as it is wide of reach. If we wish to feel the pulse of the nation we must call statistics to our aid.

The Meat Industry and Agriculture.

By LOUDON M. DOUGLAS,

Lecturer on the Meat Industry, College of Agriculture, Edinburgh.

THE meat industry is essentially a department of agriculture, and it seems to me to be a curious thing that this fact should not have been recognised long ago. It is also significant that, so far as I am aware, this is the first occasion on which the subject has been introduced at a meeting of this kind. I feel that there is no apology needed for this departure from the beaten track, as I hope to show that the absence of opportunities of discussing this matter has proved highly detrimental to education on the subject. I need hardly point out how intimate is the connection between the meat industry and agriculture, but it may be said that the ultimate aim of producing fat stock is for the use of the meat industry, and, as a matter of fact, a large portion of the live stock on the farm has ultimately to pass through the hands of the meat purveyors. In so far as the production of live stock is concerned, there are ample opportunities for students acquiring a knowledge of the principles which govern that department of the subject. In every one of the twenty-two colleges which are devoted to giving agricultural education the curriculum is designed purely and solely for the benefit of agriculturists, and if you take any of the calendars of these colleges to which I have referred you will look in vain for the indication of any course of instruction which would attract the members of the meat industry. It may be contended, however, that this is not considered necessary, and, in fact, that agricultural education should stop at the production of live stock, and that the rest should take care of itself. Will you allow me to point out that there are no other educational institutes in the United Kingdom at which meat purveyors could receive technical instruction, except at the agricultural colleges, and I hope to show that it would be a mutual advantage if such courses were provided.

In the first place there are computed to be some 45,000 master meat purveyors in the United Kingdom, and it is a fair calculation to say that each will employ at least four hands; thus the number of skilled men required to conduct the trade in the United Kingdom may be taken at 180,000. If you again multiply the original figure by four, as representing the average families, you will see that the number of people dependent on the industry is very large indeed, and may be approximately stated at 360,000 people. The meat industry in this country represents an annual turnover of nearly 50,000,000 cwt. and

in this gigantic figure is represented many different products which require technical skill in the making. It will be understood also that under the Public Health Acts the meat purveyor must possess the technical skill to enable him to distinguish the evidences of disease in live stock and in dead meat, and, should he be unfortunate enough to be found with any disease meat on his premises, he is liable to very heavy penalties. But there is no opportunity for the meat purveyor to acquire education on the subject of either the handling of the technical by-products of his industry or of the diseases of animals. He requires to be somewhat of a veterinarian, and is penalised if he is not, but there are no means by which he may obtain this technical knowledge. I think all rightly constituted people will be prepared, therefore, to admit that in the interests of the community this should be altered, and that meat purveyors should have opportunities of acquiring education on:—

1.—Diseases of Animals.

2.—Bacteriology.

3.—General Principles which Govern the Handling of Meats and their Conversion into Subsidiary Products.

These subjects are necessary to every meat purveyor, but they should also be supplemented by a knowledge of chemistry, agricultural zoology, and the principles of breeding.

BACTERIOLOGY AND PICKLES.

With regard to bacteriology, it may be specially stated that a knowledge of this subject would enable the ordinary meat purveyor to appreciate the value of pure pickles. This may appear to be a small matter, but is not really so, because at least 80 per cent. of the total number of meat purveyors of the United Kingdom use pickles for the pickling of meats, and in the majority of cases these are constructed in the most haphazard rule of thumb way. The conditions under which the pickling is carried on are, in many cases, far from being hygienic, and in samples of pickle which I have examined I have found that they have been teeming with micro-organisms of all kinds. In many cases the meat is put into the pickle when it is in a partial state of decay, and I need hardly point out that in such a condition, even if ultimately cured, it is very likely to give rise to dangerous ptomaines. Hence it is that we have records which show cases of ptomaine poisoning in England from June, 1907, to November, 1908, numbering altogether 822, and arising out of which were 73 deaths. These are only casual cases collected from the newspapers, but I think we are entitled to infer that there are many hundreds of mild cases which are never reported, and which are, to a large extent, attributable to meat which has been

imperfectly cured. I only give this as an instance of what an immense amount of good would be done by proper instruction on the principles which govern this matter, and I may say that I have found meat purveyors very susceptible to such instruction. I conducted a class, numbering about 150 students, at the College of Agriculture, Edinburgh, during last winter, and have been astonished at the constant sustained interest which was evident from the beginning to the end of the course. I think, therefore, that I am justified in saying that, notwithstanding anything that may be said to the contrary, the meat purveyors are willing to take advantage of instruction when they get the opportunity. The general principles which govern the handling of meat and its conversion into subsidiary products opens up a wide field of instruction which has so far only been available through text books, but there is no systematised course of instruction in this subject to be had at any of our colleges. As showing its vastness, I might indicate, for example, that the products from a bullock are something like over 100 in number, including, besides the well-known constituent portions of the carcass, such auxiliary products as hoofs, oleo, glue, different portions of the hair, grease, tongue, blood, intestinal offal, and many others; besides such as are converted into fertiliser. Nearly all of these products are, more or less, of a highly technical character, and would involve a special knowledge on the part of the teacher or lecturer, who would give instruction concerning them.

QUALIFYING CERTIFICATE FOR MEAT PURVEYOR.

The proper handling of meat is an art in itself, as is the manufacture of sausages and every-day products of that kind, and I contend that to fully appreciate these it is necessary that the meat purveyor should have a technical education. I would go further than that, and say that no one should be permitted to practice the meat industry without having a certificate qualifying him for that particular profession.

In so far as organising education along these lines is concerned, I think you will allow that it has been shown that there is at least a case for close enquiry. There can be no better method of offering such technical education than through our agricultural colleges, seeing that the subject itself is part and parcel of agriculture, and that the manufacture of the various products from the carcasses of animals is only the natural development of the higher branches of agriculture.

SUGGESTED INSTRUCTION COURSES.

On an occasion like this it is only possible to introduce the subject, and to throw out one or two hints as to how it may be dealt with in the future. I would, therefore, suggest that it would be possible

to organise in our agricultural colleges courses of instruction for our meat purveyors which should include:—

- 1.—Animal Breeding.
- 2.—Veterinary Practice.
- 3.—Chemistry.
- 4.—Bacteriology.
- 5.—Agricultural Zoology.

These subjects, it seems to me, are essential to the modern meat purveyor, and are indispensable to anyone who would follow the manufacture of the finer animal products. On these lines it would be possible to establish either a degree or a diploma in connection with the meat industry, and I feel assured that if this were done it would meet with the hearty co-operation of the more enlightened members of that industry. To sum up, therefore, I would state the case as follows:—

1st.—The meat industry is an important branch of agriculture.

2nd.—There is no organised system of education in connection with the meat industry at present, except what exists at the College of Agriculture, Edinburgh.

3rd.—It is essential that the modern meat purveyor should understand the *technique* of his subject, so as to detect disease, and also to enable him to make the most of the by-products and auxiliary products which he meets with in the course of his business.

4th.—In order to become efficient the meat purveyor should have opportunities of regular study on animal-breeding, veterinary practice, chemistry, bacteriology, and agricultural zoology.

5th.—The existing agricultural colleges are well adapted for carrying this proposition into effect.

6th.—The organisation of education in this particular department of agriculture should be on the lines of studying subjects which should qualify either for a diploma or a degree.

I would, therefore, invite the co-operation of the Agricultural Education Association in this matter, and I feel sure that if the members will think it over they will see that the considerations at stake are very great, and, indeed, that the institution of a regular course of instruction in connection with the meat industry ultimately means the proper regulation of our principal food supply.

Scraps from the table are excellent for the fowls, affording them a greater variety than most feed.

The "Greening" of Potatoes.

SOME KEW EXPERIMENTS.

(See Frontispiece in Present Issue.)

THE "greening" of potatoes intended for "seed," which is brought about by exposing the tubers to light for some weeks before planting until the skin assumes a dark green colour, is a practice that has been followed for many years, and is generally admitted to be productive of good results, although it is still too frequently neglected. The opinion of growers who consistently follow this practice is that the haulm or "top" is much more sturdy and robust than when the seed is not "greened," and this, as would naturally be expected, results in a better crop. Certain experiments have been conducted at Kew for the purpose of ascertaining in what particular manner "greening" proves beneficial, and the results of these experiments are published in the *Journal of the Board of Agriculture* (London) for June, in an article by Mr. George Massee, Assistant Keeper of the Royal Botanic Gardens at Kew.

Three experiments are recorded. The sprouts produced by the batch exposed to light averaged a quarter of an inch in length, and weighed a quarter of an ounce. The sprouts of the batch covered with paper averaged three inches in length and weighed $1\frac{1}{4}$ ozs. The batch of potatoes that had been covered with paper throughout the experiment weighed $1\frac{3}{4}$ ozs. less than the batch that had been exposed to light during the last two months of the experiment.

In the third case, at the commencement of the experiment one batch was covered with black paper and the other batch left exposed to light. This condition of things lasted for two months, when it was found that the covered batch had lost 1 oz. in weight and the batch exposed to light had lost about 18 grains. From this stage both batches were covered with black paper, and remained so until the end of the experiment, when it was found that the batch that had been protected from light throughout the experiment had lost $3\frac{1}{4}$ ozs. in weight, including the sprouts, whereas the batch that had been exposed to the light for the first two months of the experiment lost just over $\frac{1}{2}$ oz., including the sprout.

The batch that had been protected from light throughout contained a considerable amount of sugar at the end of the experiment, and when cooked had the sweet taste and close texture characteristic

of many potatoes in the spring; whereas the batch that had been thoroughly "greened" immediately after lifting was quite "floury" and normal.

ADVANTAGES OF "GREENING."

Discussing the advantages of "greening," Mr. Massee remarks that the time is now past when small potatoes, good for nothing else, were considered good enough for "seed." The general opinion held at the present day is that it is essential to have a good, firm tuber that has not been partly exhausted by loss of moisture and continued formation of sprouts that are broken off when the tuber is planted. As the above experiments indicate clearly, this result is better attained with "greened" seed than with seed not so treated. A potato not "greened" loses just over six times as much in weight during the season as a potato of equal weight that has been "greened." A potato that is "greened" in the spring loses twice as much in weight as a potato "greened" immediately after lifting in the autumn, other things being equal.

Under similar conditions of temperature light much retards the growth or sprouting of a potato, whereas growth is greatly favoured by darkness. The explanation of this difference of behaviour in light and darkness respectively is as follows:—Before a potato can commence to sprout a certain amount of its starch must be converted into soluble sugar by means of a ferment or enzyme. Such enzyme can only be formed in a potato when there is a free interchange between gases formed in the interior of the potato and the atmospheric air.

An experiment proved that when the surface of a potato is coated with an impermeable varnish, except the "eyes," no sprouting takes place, even under the most favourable conditions for so doing.

The act of "greening" causes the skin or periderm of the tuber to become comparatively impervious to water and gases, hence the relative cessation of growth and loss of substance, whereas the periderm of a tuber kept constantly in darkness is not so impervious. The difference in amount of suberin present in the two cases is readily apparent on the application of tests for the presence of this substance.

"The greatest amount of benefit derived from the 'greening' of potatoes," Mr. Massee concludes, "will be obtained when it is practised in the autumn immediately after lifting."

If you care for the hens and feed the young chicks well they will pay the grocery bill during the autumn and winter.

Sugar Cane.

THE CULTIVATION OF RATOON CANES.

THE question of the tillage operations to ratoon cane crops is referred to in a report recently issued by the Imperial Department of Agriculture for the West Indies, on Manurial Experiments with Sugar Cane in the Leeward Islands, 1907-8, and the discussions in the report are summarised by the official organ of the Department, *Agricultural News*, in its issue of the 17th April.

In the Leeward Islands it would seem that tillage operations in connection with the growth of ratoon canes are much more generally carried on than at Barbados, where, on the majority of estates in the ratooning districts, the land is simply trashed after removal of the plant cane crop, but little or no cultivation is done. At Antigua and St. Kitt's, on the other hand, it is a common practice to break up the soil between the young ratoon stools to a considerable depth, when the cane shoots are in a stage of vigorous growth, and have reached a height of two or three feet, with the object of bringing the land into good tilth. Either the plough or the fork is used for these operations. The cultivation thus given is more than a mere surface tillage to provide a dust mulch; it involves *deep* tillage, and the soil is turned over and broken up.

Planters who cultivate their ratoons in the manner mentioned state as a reason for these operations that they are necessary on account of the degree in which the soil has consolidated and hardened, but if the land was thoroughly tilled and prepared previous to setting out the plant cane crop it should seldom require the treatment referred to on the removal of the first crop. On heavy classes of land where two or three crops of ratoons are grown, some amount of tillage may be advantageous for the purpose of lightening and aerating the soil, but these operations would best be carried out as soon as possible after the previous crop has been reaped. If deferred until an extensive growth of shoots and roots has taken place the injury to the young roots may entail considerable damage, and, further, the loss of moisture which is involved by inverting the soil is more harmful than at an earlier stage of growth, although, of course, always to be avoided, if possible. Loss of moisture during the period of vigorous growth is a very serious matter, and may entail a check on the young ratoons from which they will not easily recover.

Before the work of tillage between the rows of ratoons is pro-

ceeded with planters would do well carefully to examine their fields by actually digging across the banks which they propose to fork or plough, in order to satisfy themselves that the soil is in as great a need of tillage as they imagine, and to assure themselves also that the operations which they perform improve the soil as much as they think. On turning over the beds of trash underlying a young crop of ratoon canes of satisfactory appearance the soil below will usually be found in a condition suitable to promote good growth.

The following notes on this matter are quoted from the pamphlet on *Manurial Experiments with Sugar Cane in the Leeward Islands* already referred to. It is mentioned in the report that the notes are submitted for consideration and discussion rather than as direct recommendations:—

It would appear that the soil when well covered by the trash from the recently-cut plant canes is frequently in fair tilth, and not unduly compact. If kept covered it retains both its tilth and its moisture. If the trash is removed and the soil is turned up to a considerable depth, and afterwards exposed to the sun, it loses moisture and sets back into a harder condition than before. If, however, the tilth is imperfect and cultivation is regarded as essential the soil should be stirred as soon as possible after the plant canes are cut and before the ratoons begin to grow to any appreciable extent. Following this, the rough soil should be harrowed at once to break any lumps and should then be covered with trash, or should be constantly stirred to a depth of about two inches in order to form a dust mulch.

When, after the cutting of the plant canes, the soil is in fair tilth good results may often follow from spreading the trash evenly on the banks and leaving the soil unstirred. The amount of trash so spread should be sufficient to keep down weeds. If the trash in a field is insufficient to keep down weeds it should be distributed over a portion of the field only, say, on alternate banks, but in such thickness as is necessary to effect the desired object. The remaining clear portion—*i.e.*, the banks which alternate with those that have been trashed—should be stirred frequently to a depth of about two inches in order to create and maintain a dust mulch, which will go far to supply the effect of trashing in conserving moisture in the soil.

Much of the cultivation now given to ratoon canes is possibly injurious.

It is repeated that these remarks are intended to draw attention to the problems to which they refer, and are not here given as rules for practice. It is hoped that planters will discuss them, and that next season a number of co-operative experiments will be laid out in order to demonstrate the soundness or unsoundness of the suggestions made.

Experiments of the kind required are easily arranged, and it is

hoped that when the crop of 1909 is being reaped planters and officers of the Department of Agriculture will consult together and plan several useful series.

This subject was also brought forward at a recent meeting of the Barbados Agricultural Society, when an interesting discussion took place.

Dr. Watts referred to his observations made at Antigua. No hard and fast rule on the matter could be laid down, and it was important that the planters should make experiments for themselves on their own estates. The real facts in this case, as in every other line of agricultural work, could only be learnt by daily observation. The loss of soil moisture was a very serious matter, and he had investigated this point at Antigua in connection with the cultivation of ratoon canes. He had invited planters to have part of the trash turned up where the soil had been cultivated a few days previously, and in every case it was seen that the breaking up of the land had caused the loss of moisture, which would not have been lost had the soil been left undisturbed.

In conclusion, Dr. Watts urged planters who grew ratoons to carry out experiments on the matter discussed. They might arrange to set apart certain sections of their fields, and treat these by other methods than those commonly adopted. The results would certainly be useful to themselves, and if they were communicated to the Imperial Department of Agriculture they might be made useful to a wider community.

To be successful with poultry it is essential to have a love for it; without that it is mere drudgery, and drudgery is seldom apt to meet with success.

For mares or cows that will not breed, dissolve the half of a common yeast cake as found in the grocery store in half a quart of warm water. Allow it to stand for twelve hours; then strain and put in a can; place on the cover and screw it down tight. Prepare this about two days before you expect her in heat. When this occurs place the strained yeast solution in a half gallon of hot water, and an hour before being bred inject into the vagina.—*Journal of the Jamaica Agricultural Society.*

Onion Culture.

By W. R. BEATTIE,

Assistant Horticulturist, U.S. Bureau of Plant Industry.

(Continued from page 195.)

HARVESTING AND CURING.

IN the North of the United States the bulbs are allowed to become as ripe as possible before removing them from the soil. Growers prefer that the tops ripen down and shrivel and that the outer skin of the bulbs be dry before they are pulled. To the southward, where the onions are not cured so thoroughly, they are often pulled about the time that the tops begin to break and fall. The ripening process may often be hastened by rolling a very light roller or a barrel over the tops to break them down. This process is frequently spoken of as "barrelling."

Methods of Handling the Bulbs.

Where the bulbs are practically upon the surface they may be pulled by hand and thrown in windrows consisting of eight or ten onion rows. If the onion bulbs are considerably covered with soil it will be necessary to employ a one-horse plough or a cultivator with a sweep attached for lifting them. In any case it will be necessary to gather them from the soil by hand. After lying in the windrows for several days and being stirred occasionally with wooden rakes they are gone over and the tops removed either by twisting or cutting with ordinary sheep shears. In cases where very bright colour is important, as with fancy White Globe onions, and this would be injured by exposure to the sun and rain, the bulbs are cured in long, narrow, low ricks formed by two rows of onions laid with the bulbs regularly in the centre, tops to the outside, the rows a few inches apart at the bottom of the rick, but coming together at the top, and the top of the rick covered by straw or boards to shed to rain. As the tops are removed the bulbs are generally placed in crates for drying. In some sections onion-topping machines are employed, the bulbs being hauled from the field to a central location and run through the topper. These machines remove the tops, grade the bulbs, and deliver them into the crates or bags. If crates are not employed for curing the bulbs are allowed to lie in the windrows for some time, and are then either put into sacks or hauled to flat cribs, where they complete the curing process. Too long exposure to hot sunshine will injure the bulbs.

After gathering into crates the crates are either stacked in the field, hauled to a central stacking yard, where the stacks of crates are covered with boards or canvas, or hauled to open sheds and there piled one upon the other with numerous air spaces until the onions are thoroughly cured.

Where the bulbs are extremely dry at the time of their removal from the soil they may be allowed to lie in the windrows for a few days only, and then sorted and cleared in the field ready for packing and marketing. Where onions are put into sacks and afterwards allowed to remain in the field the sacks should be supported on poles laid upon the ground.

In the Bermuda-onion districts, where very little attention is given to the curing of the crop, it is the practice to pack and load into the cars as soon as possible after pulling and topping. When the shipping is at its height it is not uncommon for onions that are pulled from the soil in the morning to be in the cars and on their way to market by evening; however, a portion of the crop is given a more thorough curing process, and the entire crop would be benefited by at least two days of curing before shipment.

In order that onions should keep well when stored, they must be well ripened and thoroughly cured. Those that are immature, soft, or "thick necks" should never be placed in storage, but sold as soon as gathered for whatever price they will bring. Good storage onions will rattle almost like blocks of wood when poured from one crate to another. In order that the bulbs may remain bright and of attractive appearance, they should not be allowed to lie exposed to the weather, but should be hauled and stored in open sheds just as soon as they may safely be placed in one-bushel crates.

After the bulbs have remained in drying sheds or cribs for several weeks they will be ready for screening and removal to the storehouse. In handling onions it is the rule to pass them over a screen each time they are removed, as in this way the loose skins are removed and any soft or decaying bulbs may be sorted out. When bags are used for drying in the field the onions are screened, and the bags refilled for hauling to the storage house. In screening, the onions are placed on one end of the screen while the men stand alongside and stir the bulbs about with their hands, passing them along to the opposite end, where the bags are filled.

Conditions Required in Storage.

The essentials for the successful storage of onions are plenty of ventilation, storing in small quantities, a comparatively low temperature, dryness, and safety from actual freezing. Any building wherein the above conditions may be secured will answer.

Methods of Storing.

The best method of storing onions is in standard size slat crates 20 inches long, 16 inches wide, and 16 inches deep, outside measurements. The material for the sides and bottom is about $\frac{3}{8}$ inch thick and $2\frac{1}{2}$ inches wide, four pieces being used to form a side. The corners are reinforced on the inside by means of three-cornered pieces of oak, to which the slats are nailed. These dimensions provide crates that are interchangeable, the width of five being equal to the length of four. These crates will also nest together when empty, with one inside of two turned together. The full crates are stacked in the storehouse with 1 x 3 inch strips between them to allow for the cultivation of air.

Onions are sometimes stored in slat bins holding 100 to 300 bushels each. Bags are also used to some extent, but neither bags nor bins are as satisfactory as the crates, owing to the difficulty in providing the necessary ventilation and change of air through the onions. Bulbs stored in bags or bins must be more thoroughly cured than those stored in crates. There are single large storehouses in use that will accommodate 50,000 to 60,000 bushels of onions when stored in crates.

MARKETING.

In marketing onions the first essential is to properly grade and clean the bulbs, in order that they may present an attractive appearance when offered for sale. Ordinarily the bulbs are separated into three grades—primes, seconds, and “picklers.” The primes include all those of $1\frac{1}{4}$ inches in diameter and larger, and the seconds consist of those from $\frac{3}{4}$ inch to $1\frac{1}{4}$ inches in diameter, while all those that will pass through a $\frac{3}{4}$ inch screen are sold for pickling purposes. The grading is generally done in the field during the cleaning process, but as onions shrink considerably while in storage it is necessary to regrade before placing upon the market. For cleaning the pickling onions an ordinary farming mill is employed, special screens being provided for the purpose.

OTHER TYPES OF ONIONS.

Among the types not already discussed are top onions, multipliers, garlic, and leeks, which are planted to some extent for marketing purposes.

The top or tree onion, which reproduces by means of small bulblets formed on the top of a seed stalk, is exclusively used in the production of early spring bunching onions.

The multiplier or potato onion reproduces by a division of the bulbs. In growing this variety it is necessary to plant large bulbs to produce sets for the next year's planting and small bulbs or sets for the crop of large onions. The bulbs of this variety may remain in the soil year after year, and are desirable for use early in the spring-time.

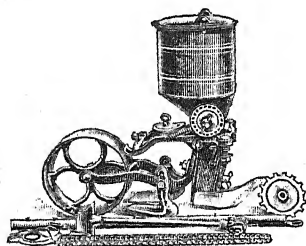
Garlic is closely allied to the onion, but will remain in the ground from one year to another if undisturbed. Garlic is planted by setting the small bulbs, or cloves, in either the autumn or early spring. The culture is practically the same as for the onion.

The leek also belongs to the same class as does the onion, but requires somewhat different treatment. The seed is usually sown in a trench and the plants thinned to about 4 inches in the row. The plants of the leek are given about the same cultivation as onions, except that after they have attained almost full size the soil is drawn around them to a height of 6 or 8 inches to blanch the fleshy stem. The leek does not form a true bulb like the onion, but the stem is uniformly thick throughout. Leeks are marketed in bunches, like young onions, and they may be stored in cellars for winter use.

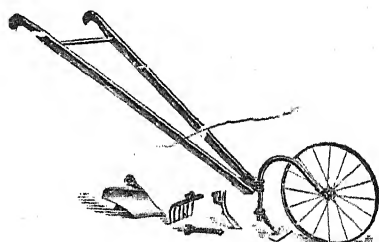
IMPLEMENTS USEFUL IN ONION CULTURE.

With reference to the first instalment of the foregoing article, appearing in the August issue, Messrs. Malcomess & Co., Ltd., the well-known machinery firm of Durban, write us regarding a useful little implement which they are selling, made for the purpose of cultivating between the rows of this crop, and fitted with a seeder attachment. The following illustrations show this implement and the seeder separately and combined, and will doubtless be found interesting to those who have read the first article on onion culture.

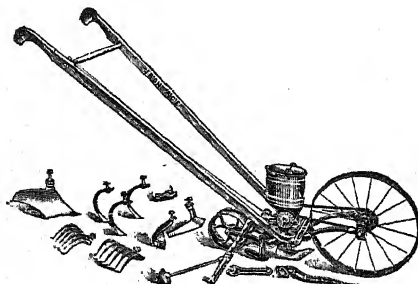
We are indebted to Messrs. Malcomess & Co. for the loan of the blocks used for the printing of these illustrations.



SEEDER ATTACHMENT FOR SINGLE WHEEL HOE.



IRON AGE SINGLE WHEEL HOE.



IRON AGE SINGLE WHEEL HOE WITH SEEDER.

Inter-Colonial Agricultural Union.

FIFTH ANNUAL CONFERENCE.

REPORT OF PROCEEDINGS.

THE Fifth Annual Conference of the Inter-Colonial Agricultural Union of South Africa opened in the Town Hall, Durban, on the 6th September. The President (Mr. Robertson, M.L.C.) occupied the chair, and among the official visitors present were: His Excellency the Governor of Mozambique, the Cape Under Secretary for Agriculture (Mr. P. J. du Toit), the Cape Chief Veterinary Surgeon (Mr. J. L. Borthwick), the Cape Government Entomologist (Mr. C. P. Lounsbury), the Natal Chief Veterinary Officer (Mr. W. M. Power), the Director of Natal Experiment Stations (Mr. E. R. Sawyer), the Natal Government Entomologist (Mr. Claude Fuller), the Natal Government Bacteriologist (Mr. H. Watkins-Pitchford), the Chief Veterinary Surgeon of the Transvaal (Mr. C. E. Gray), the Transvaal Director of Agriculture (Mr. F. B. Smith), the Transvaal Government Botanist (Mr. J. Burt Davy), the Transvaal Government Mycologist (Mr. J. B. Pole-Evans), etc.

Letters were read from General De Wet, Minister of Agriculture of the Orange River Colony, the President and Secretary of the Agricultural Union of Rhodesia, and Mr. Miller of the Transvaal, regretting their inability to attend the Conference.

The following is a complete list of the delegates present:—

Cape Colony—Messrs. P. R. Malleson, Oscar Evans, C. G. Lee, B. K. Mayo, D. W. Brown, P. W. Michau, Alf. P. Everitt.

Natal.—Messrs. H. Wiltshire, John Moon, H. Blaker, John Marwick, D. R. Bester, J. M. van Rooyen, Rev. Jas. Scott, A. von Levetzow, B. Crompton, G. Leuchars, T. Burman, O. Hosking, W. F. Clayton, W. W. Sykes.

Orange River Colony—Messrs. C. T. M. Wilcocks, C. McG. Johnston, W. J. Palmer, G. A. Kolbe.

Rhodesia—Mr. E. A. Hull.

Transvaal.—Messrs. H. R. Baily, W. H. Poulteney, E. W. Hunt, Matt. Lochhead, Wm. Pott, J. van Alphen, Jas. J. Smith.

The report of the Executive Committee having been read and adopted, replies to resolutions passed at the last Conference received from the various South African Governments were then read by the Secretary.

At 11 a.m. His Excellency the Administrator of Natal (Sir Henry Bale) arrived, with His Worship the Mayor of Durban, and, after welcoming them, the President read his annual address, as follows:—

PRESIDENT'S ADDRESS.

GENTLEMEN,—It is a pleasing duty to welcome you to this, the Fifth, Annual Conference of this Union which has been held since the close of hostilities. The Union had been in existence for some time before the outbreak of war, but its sphere of operation was then much more limited than it now is.

There has been some difficulty in fixing a date for the Conference which would suit all the Colonies which are affiliated with the Union, and it has occurred to me that it will be well for us to decide upon some one month in the year during which our Conferences must be held in the future.

In reviewing the work of the past year, it is necessary for me to point out the conditions which have existed, and which have militated against the holding of meetings of your Executive Committee. As you all know, the period which has elapsed since our last Conference in Bloemfontein has been characterised by much political uncertainty, and this has reacted upon the work of our Union, and made it undesirable to attempt to hold our usual meetings. This condition of affairs has made it necessary for me, as President, as far as possible in consultation with the affiliated Unions, to take certain action which, under ordinary conditions, would have required the sanction of a meeting of the Executive Committee. I hope, however, that any such necessary action will meet with the approval of this Conference. The past year will stand out in the history of South Africa. I fully believe, as one of the most prominent landmarks in the pathway of our general progress, and will be looked back upon as one of the many turning points which have led to the fuller development of our national life.

I am safe in saying that the unification of our divided territories is one of the objects which has animated those who, in the past, have taken an active interest in the work of this Union, and I feel that the consummation of that ideal will give gratification to those who have toiled with us in the days that are gone. We have, during the past year, been constantly on the tiptoe of expectation, and there have been times when we have feared that it was impossible to find a basis of settlement which would meet the diversified needs of the parties interested, and it is with thankfulness that we are able to look back to-day upon a settlement which has been achieved through that spirit of generous compromise, which has looked beyond the individual desire, to the general good of all South Africa. It is to that self-same spirit, gentlemen, that we must look for the realisation of the ideals which

we have set before us in respect of our common South African agriculture.

It is gratifying to be able to state that, in spite of these peculiar conditions, the year now past has, on the whole, been one of progress. Many of the suggestions which we have made have been favourably received by the Governments concerned, and in some instances laws have been framed to meet the needs which we have pointed out. Broader views are animating our farm life, and there is a very general striving after what, only a short time ago, would have been regarded as Utopian. No one who has visited the leading shows in our various Colonies can have failed to be struck with the very general improvement in the live stock, in our wool, and in the products of our cultivated areas, while the spirit of inquiry and enterprise which is permeating the farming community in every Colony is one of the most hopeful signs of our age.

Taking the Colonies as a whole, it may be safely said that development is taking place on every hand. It is true that the wine farmers of the Cape are passing through a period of very severe depression, which demands our practical sympathy, and which should lead to the suggestion of remedies by this Conference for its removal. It is equally true that the stock-farmers of Natal have suffered very severely in connection with the scourge of East Coast Fever, and it is the duty of this Conference to suggest means whereby this unfortunate but plucky Colony may be assisted, under a united Government, by its more fortunate neighbours, in the complete eradication of this terrible plague. In spite of all this, the liberal rains which have fallen throughout the whole of South Africa have given to us a year of phenomenal crops: our stock is improving in quality and increasing in numbers, our exports are going up by leaps and bounds, our scientific men are discovering preventives and remedies for our stock diseases, educational facilities are being extended, and the vast areas of South Africa are being linked together by railway, postal, and telephonic systems. But better than all this, there is growing up in our midst a national spirit which will find its truest and best expression in that feeling of mutual interdependence which must result from our common interests. Mistrust is giving way before the onward march of an ever-growing mutual confidence, which is based upon a more intimate understanding of each other's circumstances.

The financial crisis, following naturally in the wake of a devastating war, has set men thinking, and we are beginning to come to a truer knowledge of our actual conditions than we have ever before possessed. Adversity is a hard schoolmaster, which teaches useful lessons that are too often neglected in times of prosperity. We are beginning to see the folly of depending upon the producers of other countries for the very necessities of our daily life, and have set our-

selves to the work of remedying the disgraceful condition of affairs which existed only a very short time ago, with the result that our import of articles which can be locally produced are diminishing from month to month. It is well that some credit for this welcome improvement should be given to Sir Pieter Bam and his earnest band of co-workers who form the members of the South African National Union. Whether there should not be a closer connection between that Union and our own is a question which might well occupy the earnest attention of this Conference.

Cape wool, feathers, grain, and fruit are increasingly becoming a part and parcel of the imports of European countries, and, generally speaking, are winning for themselves a sure place in the public favour.

The Orange River Colony, whose delegates we specially welcome to this Conference, is coming to the front with its horses, its maize, and its sheep, which latter are increasing by thousands every year, and the wool from these sheep, as the result of careful handling and combined shipments to the European markets, is rapidly acquiring a very prominent place in the estimation of the manufacturer. I am informed that an official of the Agricultural Department of that Colony is now in Europe, and that he is commissioned to spend some thousands of pounds in the purchase of pedigree cattle for the improvement of the local stock. Large quantities of Free State butter are being already sold in the Transvaal, and the influx of better dairy stock will render it more necessary for progressive Transvaal dairy farmers to neglect no opportunity of holding their own.

Natal, in spite of the heavy blows from which she has suffered, is still peopled by a race of farmers who do not know what it is to be beaten, and who are ever ready to experiment with new crops, and to adopt new methods for the development of their agricultural industry. They will yet show to the rest of South Africa what can be done by more intense cultivation and the careful selection and marketing of their numerous products.

Rhodesia is taking steps to encourage an increase of her farming population, and a class of settler is being attracted to that country who is possessed of up-to-date ideas, and who, given favourable conditions of tenure, will yet make his mark in the agricultural world of South Africa. Much money has been invested in the purchase of valuable pedigree stock, the beneficial results of which will be shortly seen in the general improvement which is bound to take place. It is a pleasure to me to welcome their delegates to this Conference.

An Agricultural Department has been established in the Portuguese Colony of Mozambique, and Mr. Barrett and his staff of experts have already done much in the direction of laying a solid foundation upon which a permanent industry will sooner or later be raised. This

very real progress is largely attributable to the practical sympathy and the energy of His Excellency Major Freire d'Andrade, the Governor-General of this wondrously fertile Province. In the midst of much opposition, both locally and in Portugal itself, he has set himself to develop the agricultural resources of the territory under his administration, and his efforts are now in a fair way of being crowned with success.

In the Transvaal a sympathetic Government has taken up the work so ably begun under the Crown Colony regime, and has spared no effort to promote the best interests of the farmer. A splendid laboratory, equipped with all the latest scientific instruments, ably staffed, and under the control of the Government Bacteriologist, Dr. A. Theiler, C.M.G., who is now representing this Union at the International Veterinary Conference in the Hague, takes the lead in the work of investigating the stock diseases from which South Africa suffers so severely, and the triumph of science over disease is well illustrated in the fact that out of 12,000 mules inoculated against horse-sickness less than three per cent. succumbed during the unusually trying epidemic of last season. It is hoped that during the present year the possibility of immunising horses against this devastating disease will be established beyond the shadow of a doubt. Exports are increasing, while the imports of agricultural products are rapidly decreasing. Flocks and herds are multiplying, and are rapidly improving in quality. An Agricultural College, capable of accommodating some fifty students, was recently opened, and the schoolmaster is abroad in the land, in the shape of able experts, who are giving of their best in the establishment of a successful industry. I hope I shall not be charged with self-conceit if I quote the words of your former President and say that "the Transvaal is taking the lead in South Africa in matters agricultural." Presuming that this be true, may I urge upon this Conference to see to it that there be no levelling down of our ideals to the agricultural conditions which may prevail in less favoured Colonies, but that there be a determined effort made to level all up to the ideals which we, as a Conference, have set before us.

I feel that I should fail in the discharge of my duty as President of this Union did I not publicly state what I know is the honest conviction of every farmer here present that the general agricultural prosperity of South Africa is very largely due to the enthusiastic and practical sympathy of His Excellency the Earl of Selborne, His Majesty's High Commissioner for South Africa; and I am sure that I voice your sentiments when I express the hope that he may long be spared to us in his capacity as "the farmer's friend."

Such is a brief and very imperfect sketch of some of the happenings in the farming world of South Africa which have characterised

the past year, and, if I may be allowed to make use of an Irishism, I would characterise this sketch as "a looking back into futurity," for I take it that past progress is but the earnest of future developments which are now brought within the range of practical farming.

Among possible developments I can but mention a few: First and foremost is the necessity for strengthening the position of this Union. This is a natural outcome of the political developments which are taking place. As I understand the position, the agricultural interests of each Province of South Africa will be largely entrusted to its Provincial Council, while the Central Parliament will exercise oversight in connection with such matters as are of an inter-Provincial character. This being the case, it is more than ever necessary that the local Unions now existing should become much more active than they at present are, and that, where such Unions do not exist, steps should at once be taken for their formation. These local Unions should have their branches in every district of the Colony concerned, thus forming a complete network of active members bent upon improving the prevailing conditions of farming life. We must cease to distinguish between the spheres of a so-called Agricultural Society and a Farmers' Association, and must realise the truth that "he that is for us is not against us." Much valuable time has already been wasted in this direction, and if there be any justification for the statement that the aims of the one body do not include the aims of the other, this must be remedied by the framing of a constitution which will be sufficiently elastic to make use of any man or any body of men who, in however small a degree, are anxious to promote the progress of South African farming. Such local Unions having been formed, and their branches established, we must see to it that this Union, by virtue of the intelligence, the energy, and the influence of its members, shall become such a power in our united country as to be recognised as the "Parliament of South African farmers." It should be a body to which can be referred, for impartial consideration and settlement, any of the many points which must arise in the future, and which will concern the welfare of agriculturists throughout South Africa. There must be a well-informed central office, which can readily come into touch with the Government which will administrate the affairs of South Africa as a whole, and its Executive Committee, while small in numbers, must consist of picked men who are in a position to devote both their intelligence and their time to furthering the work of the Union. Great care will need to be exercised in securing that the members of the Executive are kept in the closest touch with the Unions to which they belong, and that they adequately represent the progressive and intelligent opinion of their constituents. This will necessitate the remodelling of our constitution, so as to bring it into harmony with the changing requirements of the

times. It will also necessitate the increase of our annual income, so that the proposals made may be properly carried out. Some amendments of the Constitution have been suggested in a draft which has been prepared for the consideration of this Conference, and it is hoped that before we rise we shall have laid a foundation upon which a super-structure of a permanently beneficial character will be reared.

The aim of our Union should be to improve very materially the social, educational, and the commercial aspects of our common farm life. Lack of time prevents me from dealing at any great length with these questions, but I wish to emphasise the fact that our district Unions should aim at improving our social conditions on the lines which have been so successfully followed in America and Canada, where the farmers' guilds have entirely changed the ordinary conditions of farm life. We must learn to know each other by realising that it is our duty to help each other. As regards education, it is pleasing to find that, in three of the existing Colonies, Agricultural Colleges have been established. Good work has been done by two of these institutions; that of the Transvaal is still in its swaddling clothes, but we have hopes that it will become a sturdy competitor with those already in the field. This is good as far as it goes, but it does not go far enough, and I am not yet convinced that it baffles the wit of man, least of all South African man, to devise a scheme, which will naturally be of slow growth, whereby the staff of the most elementary country school will be equipped for the teaching of the rudimentary principles of agriculture to those whose future prosperity will depend so largely upon the possession of that "knowledge" which, in the truest sense of the word, "is power." I am not disposed to minimise the difficulties which I know exist, but I am fully convinced that we shall never solve the problem by "shying" at it. A colloquialism, well understood by most of you, best expresses my meaning, "Ons moet woel!" In respect of the commercial side of our life, much might be said, did time permit. The great need is that, with increasing quantities, there should be a corresponding quality attaching to our products. Our horses, while serving most excellently the purposes for which they were originally bred, have largely been superseded by the railway and the motor car, but there yet remains a most profitable market in the supply of remounts for military purposes; of riding horses for those who prefer the sensation of bestriding a graceful and sensitive living animal to the smell of petrol and the rattling of the gear of a motor car, and for those who, in our larger towns, will, we hope, long continue to take a pride in a spanking pair of carriage horses, the embodiment of vigorous life, and beautiful action. The day of the patient ox has not yet passed away, and I am of opinion that the best type of Africander will never be superseded for many farm and draught purposes, but in respect of dairy and slaughter cattle, many of us have a long way to travel before we

can hope to take our legitimate place among the stock-farmers of other countries. To this end means must be devised whereby the securing of a good quality of sire must be brought within the reach of the ordinary farmer, by means of co-operation, and of deferred payments to Government Stud Farms.

Our sheep are rapidly improving, both in numbers and quality, but there is still much to be accomplished before we shall attain to the position which has been reached by many Australian breeders. We have, so far, done very little in the direction of producing a sheep whose value for slaughter purposes will repay the farmer, and have been content to feed ourselves and our customers with mutton of a very questionable character. We shall soon have a large surplus over and above local requirements, and shall have to find a foreign market which will demand the best which we can produce. The shameful wastage connected with our wool industry is one upon which I prefer not to speak, except to say that inferiority in quality, negligence in handling, and the prevalence of scab in our flocks, probably cost us in a loss of hundreds of thousands of pounds per annum.

The world's markets are open to us so far as our cereals are concerned, and I believe we shall yet see the day when, by means of deeper ploughing, adequate cultivation, and the use of fertilisers, we shall occupy no mean position in the cereal markets of other countries. We shall need to urge upon our Governments the necessity of erecting spacious central storehouses, where maize can be graded, and delivered to the docks in a dry condition, so as to prevent a repetition of what has recently taken place in this town, and we must also see that sufficient accommodation is provided by the shipping companies, in their vessels, so that there may be no needless delay in reaching European markets. The discovery of a rust-proof wheat, which is bound to come, will render large areas in South Africa exceedingly valuable.

Fodder crops are, to a very large extent, but slightly cultivated, and we are still contented, in certain areas, with the very dangerous and wasteful custom of trekking to winter veld, thus spreading disease, and producing breeds of animals "who never continue in one stay," and who, if they are to live, must acquire immunity from the diseases of the high, the low, and the middle veld.

We need to encourage the establishment of local industries, which shall be protected from the "dumping" system which now enables foreign manufacturers to dispose of their surplus products in South Africa, at prices below those realised in the countries where their factories exist, for the express purpose of crushing out of existence any newly-established local industry. Such industries will mean a large increase in population, which population will need to be supplied with the necessaries of life at prices far below those which now prevail. Thus the solution of the

economic problem lies in the hands of those whom we represent, and will be found in the adoption of those methods which will double, or even treble, our output, at a slightly increased cost.

The fruit industry is one, the potentialities of which we have barely begun to realise, and the day is not far distant when our fruit products will find a ready sale upon the largest European markets. All this will necessitate the exercise of individual industry and skill, and an infinite capacity for taking pains. It also implies the conversion of railway administrations, and the governing bodies of shipping companies to that exercise of practical sympathy with the farmer which is now so sadly lacking. Failure in this branch of industry cannot be laid solely at the door of the farmer.

Stock diseases must be fought, and no Government will discharge its proper functions so long as it fails to make provision for the fullest and most competent modern research.

Our vast stores of rain water must be conserved, and we must see to it that our most fertile valleys are not annually denuded of the rich deposits of soil which are now being carried to the sea.

Home industries must be fostered, so that our rural population may learn to supply themselves with many articles which are now imported from elsewhere. Even though such industries cannot be run at a profit, they will effect a very considerable saving in household expenditure.

We need a live newspaper, which should reach the home of every progressive farmer, and which would supplement the very excellent work of our agricultural journals, and become the indispensable companion of all who are striving to improve the conditions of rural life.

To sum my remarks in brief, I would say that we need higher ideals, a more determined purpose, and that united endeavour which will bring to pass the prosperity of our nation, two-thirds of whom are inhabitants of rural areas; and which will make of South Africa a happy and peaceful home for all her stalwart sons, and her devoted daughters.

THE ADMINISTRATOR'S ADDRESS.

His Excellency the Administrator then addressed the Conference. He said he appreciated very highly the honour done him in asking him to open the Conference, and he then referred to the spirit of optimism which had characterised the President's address.

He would like to speak to them as brother South Africans—(applause)—and brother farmers—(renewed applause)—because he hoped that in his old age he would revert to the land and become a farmer. (Applause.) Sir Henry McCallum, in opening their first Conference in Maritzburg some years since, recognised with prophetic eye that such meetings as these were preparatory steps towards Union. They all knew what stage of Union they had now reached, and it rested with them and with others concerned in the prosperity of South Africa to consum-

mate that Union and make it a great success. (Applause.) He had no doubt that the great developments to which reference had been made, and others they had in their mind's eye, would be outdistanced by future developments, which would make South Africa a great agricultural country. Co-operation between various classes of the community, and the various parts of South Africa, should be encouraged, because it would ill become them to think that one part of the community could get on without the other. Commerce and agriculture were dependent on each other, and not hostile. They ought to remember the old quotation, that the goldsmith encouraged the carpenter, and the carpenter encouraged the goldsmith, and so the farmer should encourage the export merchant in the latter's efforts to distribute the produce of the land, and he (the speaker) knew that the merchant in town would encourage the agriculturist. When he was a member of Parliament he found that, while other bodies were united, the farmers when they asked for legislation never knew what they wanted—(laughter)—and when a farmers' Bill came before the House it used to be said, "Oh, we will leave this to the farmers: let them fight it out." (Laughter.) Had the farmers been united they would probably have given Parliament in his day a very great deal of trouble. (Laughter and applause.) He ventured to suggest that the farmers should confine their fighting to their Conferences and present a solid front when they applied to Parliament for legislation—(hear, hear, and applause)—knowing exactly what they wanted, and he was sure they would find Parliament sympathetic—and if they did not, they would be able, by force of numbers, to compel Parliament to do what was wanted. (Applause.) He was not advising them as Administrator—(laughter)—but rather, as he hoped to become, as a farmer himself—(renewed laughter and applause)—and he trusted that when he got back to Maritzburg Ministers would not find fault with him for having disclosed some of the secrets of Parliamentary procedure (Laughter.)

It was quite right to ask Government assistance in the way of facilities for transport, exportation, establishment of agricultural colleges, and so on; but at the same time he trusted that there would be no relaxing or discouraging of that individual effort without which there could be no great progress. (Applause.) There was sometimes a danger, especially in modern times, of trusting too much to the Government to do work which the people should do for themselves. They should remember the lessons of the past, and how little help the pioneers of South Africa got from the Government, and how much they were able to accomplish, notwithstanding difficulties and discouragement. By patient effort, and by earnest seeking, present-day farmers would overcome the many difficulties they had to contend with and would not only attain material success, but would also acquire those qualities which made for true manhood.

(Speaking of the matter of teaching elementary agriculture in the schools of the country, His Excellency said he was very much struck with the suggestion that, in their schools, even in their primary schools, they should endeavour to get pupils at an early age to specialise. He thought it had been a great mistake that a good deal of their education had been imparted without any direct reference to the future occupation of the scholar. He was quite certain that no difficulties would be experienced in giving special instruction in agriculture in the same manner as was at present done with regard to certain commercial subjects. In certain other Colonies of the Empire instruction was given in elementary agriculture. The time was not far distant for the establishment of a Central Veterinary College for South Africa—(applause)—and any teachers or methods imported from overseas therefor should certainly be supplemented by those available locally, because in South Africa they had diseases which were not found in other parts of the world, and it would be wise to benefit by local experience. It would be a good thing if they could also establish a travelling scholarship in one of their agricultural colleges, similar to the travelling scholarships awarded in English Universities.

Referring to the desirability of making use of what many farmers in South Africa regarded at present as waste products, Sir Henry said there were no "waste" products: the waste products, so-called, could be utilised for industrial purposes. They were not, as a rule, economical in the use of mechanical appliances, in the use of Nature, and in the use of the refuse of their farms. There could be no doubt that in the United States of America the principle of making the best use of by-products had been thoroughly recognised, as illustrated in the case of cotton, the by-products of which were found to be of extreme value. The time would probably come in South Africa when farmers would provide winter feed for their sheep, instead of shifting them about from one place to another.

With regard to the natives, His Excellency thought some effort should be made to teach them to be more economical in their methods of agriculture and they should not be encouraged to remain in idleness when they had done the small amount of farming in the year necessary for their own requirements. They wanted to teach the natives to become bigger producers than they were and to help them in the building up of an export trade.

It was important that South Africa should be able to supply such a large quantity of maize that the European markets would be able to depend upon this country for large supplies. He had heard it suggested that they could not get a market for one of their Natal products because the supply was limited. Well, they must increase the supply—(applause)—and what they exported should be of good quality and

thoroughly graded. They should take full advantage of the very able experts provided by the various Governments, and he did not think it would be well to ignore the advice of these experts, because it was easier to lose than to gain markets, and if once a market be gained everything possible should be done to retain it.

His Excellency praised the work of the experiment farms, and concluded by exhorting all classes and races to sink their differences and work together to make South Africa the fairest jewel in the Imperial Crown. (Applause.)

Mr. C. G. Lee (Cape Colony) proposed a hearty vote of thanks to His Excellency the Administrator for his attendance and address, which was unanimously adopted.

The Mayor of Durban extended, on behalf of the burgesses, a hearty welcome to the delegates, and expressed the hope that their Congress would be a success. Their deliberations were taking place at an eventful period in the history of South Africa. They were all looking for some sign with regard to the future policy of the country—some indication as to what would occur in the near future. He ventured to think that many eyes were turned towards that Conference, because agricultural conferences, as he knew from experience, devoted a considerable time to political subjects—perhaps a little too much. They would be closely watched, and the results of their deliberations would have a great influence on the policy for the future of South Africa. It therefore behoved them to recognise their responsibilities, and he knew he could leave it there. He trusted that the stay of the delegates in Durban would be a pleasant one. (Applause.)

A vote of thanks having been accorded the Mayor, His Worship then left, accompanied by the Administrator.

MAIZE EXPORT.

The minutes of the previous Conference having been confirmed,

Mr. Pott (Transvaal) asked leave to withdraw Resolutions Nos. 9, 52, 54 and 55, substituting the following resolution therefor:—

“(1) That it is considered essential that all mealies for export be graded as to size before being bagged by farmers.

“(2) That sufficient trained inspectors be appointed by Government to inspect as to quality and condition all mealies guaranteed graded as to size, upon delivery of same at railway stations and only passed parcels get benefit of export rate.

“(3) That the Railway must provide sheds at all stations where a required minimum of mealies is guaranteed for railage by farmers, storage for export mealies to be free for time required for inspection and railage only.

“(4) That export rate of railage be granted only to nearest port to

receiving station unless Railway Authorities or an organising officer (to be appointed) find it advantageous to send it to a further port.

“(5) That Government appoint an organising officer to receive estimates of mealies coming forward for shipment, who should be in touch with farmers, shippers, Railway Department and shipping companies and co-ordinate and regulate the railage and shipping.

“(6) That Government be asked to endeavour to make it a condition when placing the mail contract or other Government contracts, that shipping companies quote a rate for mealies and Kafir corn which will not be altered without three months' previous notice and after discussion of same between shipping companies and Government.

“(7) That Government organising officer considers and reports to Inter-Colonial Agricultural Union and to each Agricultural Union separately, how best to attain shipment in bulk, and what would be necessary to be done by Railway, Port and Shipping Authorities to carry this out.

“(8) That the Agent-General be asked to report to headquarters here upon shipments delivered in Europe.

“(9) That Agents-General be asked to cable at regular periods to papers here, official prices of South African mealies on the European market.

“(10) That railage charges be uniform to all ports and cover loading and other port charges.”

Mr. Van Alphen asked, with reference, to paragraph 1, how the farmer was going to grade his mealies, when he often sent them in small, varied lots? He referred also to the difficulties storekeepers in the country would meet with in endeavouring to grade and forward the various classes of mealies bought up by them. As regards the mail contract, he was not in favour of the mover's proposition in this respect. With regard to paragraphs 8 and 9, he suggested the appointment of a commercial agent for South Africa.

The Hon. W. F. Clayton (Natal) suggested that the Government be asked to establish a central depot, to be worked by farmers' unions on co-operative principles. He moved, as an amendment, the original Resolution No. 52 on the agenda paper, *viz.* :—

“That this Conference urge upon the various South African Governments the necessity of providing suitable control depots for the reception and grading of cereals destined for export, and establishing warehouses capable of containing large quantities of graded grain, ready for shipment, at short notice.”

Mr. Hunt did not think that Resolution No. 52 could be moved as an amendment. What Mr. Pott wanted to do was to save the farmer from himself. Buyers had been sent out by English houses, who purchased grain from farmers to be delivered within a few weeks. This

accounted largely for the railage of wet mealies which had been a feature of this year's export trade.

Col. Leuchars, by permission, added Resolution No. 9 of the agenda paper to the amendment moved by Mr. Clayton, as follows:—

“That this Conference urge all the Governments of South Africa to take steps to secure that the charge for the shipment of cereals, and their products, be reduced to the level originally granted in respect of maize.”

Mr. Ridler addressed the Conference by special request. In the course of his remarks, he pointed out the necessity for the standardisation of types. He considered that standard samples should be in the possession of all the graders at the various South African ports, and by the railway administrations, in order that all grades of one description might be of the same standard of excellence at all the ports. He considered that grain should be sold on its own merits. There was a lot of maize graded F.A.Q. which was nothing but rubbish. If maize were sold on its own merits this would not injure the reputation of our maize, since Canada shipped large quantities of rubbish wheat, but this did not do any damage to Canada's reputation as a wheat-producing country.

Mr. Pott, in reply to a question, said that he submitted his resolutions to the President of the Johannesburg Chamber of Commerce, and Mr. Keeling, a prominent exporter, and they both said that there was nothing in the resolutions antagonistic to their interests.

The amendments moved by Mr. Clayton and Col. Leuchars were carried.

EDUCATIONAL.

Mr. W. F. Clayton (Natal) moved:—

“That this Conference strongly urge upon all South African Governments the necessity for the teaching of the rudiments of agriculture to children attending country schools.”

Mr. C. G. Lee moved as an amendment:—

“That, in the opinion of this Conference, the time has arrived for fostering a greater love for and interest in rural life. With a view to secure this object, the Conference recommends to the various South African Governments the introduction of nature study into all schools. Further, this Conference strongly urges the introduction into certain schools of a course of technical agricultural training, practical as well as theoretical, such course to be an optional one and to be uniform in principles in all schools adopting it in South Africa. The different educational departments in South Africa to decide upon the standard upon which such a course shall first be introduced. This Conference is of opinion that institutes should be opened for training teachers to take up the work of teaching nature study, together with agricultural courses.”

Mr. Lee said that the tendency of modern education was to bring about an efflux of population from the rural districts to the towns. Whilst the growth of the towns was desirable, it was also desirable that as many men and women as possible should be induced to settle on the land. This could be very materially aided by the introduction of rudimentary agricultural education into the country schools. He recognised, however, that teachers were needed, and for the purpose of providing for the fulfilment of this want he had included in his resolution provision for the training of teachers upon the required lines.

Mr. Van Alphen seconded.

Mr. E. R. Sawyer said that during August of this year a special course had been provided for the benefit of school teachers, in order that they might obtain instruction in nature study with special reference to agricultural conditions. Modern agriculture included a large number of sciences, and the farmer nowadays must have a scientific training to fit him for his work. There was a great gap between the investigator and the farmer, and some means must be provided to serve as a link between the two. For this purpose they had their agricultural journals, the newspapers, and the agricultural shows.

Mr. Hull (Rhodesia) said they must train up the youth to be a proper scientific man.

Mr. Burt-Davy said that in the Transvaal special agricultural courses were being given this year to teachers in some of the normal colleges, and gardens for the purposes of nature study were being started by the teachers who have been through their courses. The Government had a larger scheme in mind, which it was hoped would be put into operation shortly.

Mr. E. W. Evans (Natal) said they must look ahead and train their teachers to give instruction in elementary agriculture in the future. This had been commenced in Natal and the Transvaal, but he thought that a resolution such as Mr. Lee's would serve as a useful guide to the various Governments for the provision of agricultural education upon uniform lines throughout South Africa, whilst it would also give some idea as to what is really required.

Mr. Hunt said that they must get both boys and girls interested in farm life, in order to keep them on the land.

Mr. McDermott (Cape Colony) said that in his Colony the difficulty was to fit in agricultural instruction with an already overloaded course of ordinary school study. The Education Department hoped to overcome this difficulty by providing an interesting rural reader, dealing in an elementary way with all the various branches of agricultural science. A point which should be thought of was the fact that all the boys of a school were not necessarily going to become farmers.

Mr. Moon (Natal) pointed out that the majority of the farmers

of his Colony made lawyers and clerks of their sons instead of making them farmers.

Mr. Clayton withdrew his resolution in favour of Mr. Lee's amendment.

Mr. Lee's amendment was carried.

RAILWAY MATTERS.

RATES ON FERTILISERS, ETC.

Rev. Jas. Scott (Natal) moved the re-affirmation of the following resolution:—

"That this Union deems it urgently desirable that the rates now prevailing upon South African railways, in respect of fertilisers, fencing material, and articles such as grain bags, etc., needed for the export of agricultural produce, should be reduced to the lowest possible level."

Mr. C. G. Lee (Cape) suggested that the Railway Administrations be asked to carry fertilisers, etc., at a rate that would just cover cost.

Mr. Salmon, representing the Natal Government Railways, said that the rates on the goods mentioned were particularly low, and in particular he did not think a lower maize rate could be found anywhere else in the world.

Mr. C. H. Mitchell (Natal) moved that the resolution stand down.

As an amendment it was moved that the resolution be withdrawn, and this was accordingly agreed to.

Mr. A. W. Hunt (Transvaal) moved:—

LIVE STOCK TRAINS.

"That it is necessary that fast live stock trains should be run from various centres to Johannesburg on certain fixed days in each week."

Mr. Baily seconded.

Rev. Jas. Scott moved as an amendment:—

"That it is necessary that fast live stock trains should be run from various centres to Johannesburg and other centres when traffic warrants such a course, and that these trains be run on certain advertised days."

Mr. Hunt withdrew his resolution in favour of Mr. Scott's amendment.

Mr. Scott's resolution was carried.

Mr. Poultney (Transvaal) moved:—

"That the various railway systems of South Africa be approached with a view to securing the same privilege for the staffs of monthly agricultural papers, such as the *Farmers' Advocate*, *The S.A. Agriculturist and Stock Breeder*, *The S.A. Farmers' Journal*, etc., as are granted to the staffs of daily and weekly papers when travelling in the interests of such papers."

The Secretary explained, upon request, that certain newspapers in the Transvaal were given special travelling facilities, but such facilities were not given to agricultural papers. He also stated that agricultural papers were carried by post at specially low rates.

The resolution was carried.

Mr. Baily (Transvaal) moved:—

“That returned empties of a recognised sort for sending fowls, butter, eggs, etc., be sent free of charge by the railway.”

Mr. Baily agreed to the addition of the words “wine cases.”

Mr. Hunt (Transvaal) said the passing of the resolution would involve the defeating of their own ends; a small charge should be made in order to get their “empties” back. When “returned empties” were not charged for by the railways they were very often lost. He moved as an amendment the substitution of the words “at the lowest possible rate” for “free of charge.”

Rev. Mr. Scott (Natal) moved as further amendment that empties be returned on payment of a registration fee.

Mr. Baily withdrew his resolution in favour of Mr. Hunt’s amendment.

Mr. Salmon (Natal Government Railways) said that when they carried empties free they had truck-loads of all sorts of rubbish to return to consignors, and when a charge was imposed this rubbish fell off considerably in quantity.

Mr. Hosking (Natal) moved that empties be carried at the same rate in other Colonies as in Natal.

Mr. Hunt’s resolution was carried.

Mr. W. M. Struben (Transvaal) moved:—

“That railway rates on artificial manures be reduced to a minimum.”

Mr. Hunter (Transvaal), in seconding, pointed out that the application of artificial fertilisers resulted in larger yields of crops such as mealies, which meant more work for the railways.

The Rev. Mr. Scott (Natal) remarked that mineral phosphates existed in many parts of Natal and probably in other parts of the sub-continent, and he had much pleasure in supporting the resolution as it would considerably benefit the fertiliser industry of the Colony and so help to lessen the imports of fertilisers from abroad.

Mr. Marwick said that it would certainly not benefit the railway to the extent supposed, as mealies were being carried at a very low rate.

The resolution was carried.

“DUMPING.”

Mr. Hunter (Transvaal) moved:—

“That in the interest of South African manufacturers who, in many cases, employ local agricultural products it is necessary that a

law be framed to prevent the 'dumping' of goods manufactured overseas within South African territories at prices below those charged in the ordinary course of wholesale trade in the countries where such goods are manufactured."

Mr. Blaker seconded. He said a young Colony needed protection against "dumping" of goods from overseas.

Mr. Van Alphen said that if South Africa was compelled to produce, by a system of protective duties, what it wanted, it would soon be a flourishing country.

Rev. Mr. Scott opposed the resolution. He for his part welcomed cheap goods from overseas.

Mr. Wilcocks (O.R.C.) pointed out that bankrupt stocks were often sent to this country from overseas, and that was a thing that certainly ought to be put a stop to.

Mr. Nicholson said that when firms like Messrs. Lever Bros., Price, Hartley, etc., took to "dumping" their surplus stocks in South Africa it was high time that the farmers of this country made their voices heard against such practices. If such firms would establish branches in South Africa upon honest, competitive, business lines he would welcome them, but the "dumping" of surplus stocks should be put a stop to.

Mr. Lee thought the resolution, as worded, was rather vague. "Agricultural products" were referred to, but he asked, if the importation of certain products in large quantities from abroad were stopped, whether South Africa was yet in a position to supply such products in sufficient quantities or the raw materials for manufacture. He thought the "agricultural products" should be specified.

The mover, in reply, said that the object of the resolution was to prevent the dumping of products from abroad in South Africa at prices that were lower than the wholesale prices for those products in the country of production. That was all he wanted—not protection: he would be the last man to get up and ask for wholesale protection.

The resolution was carried by 33 votes against 5.

CARRIAGE OF SEEDS.

Mr. C. H. Mitchell (Natal) moved:—

"That, seeing that the farmers of South Africa are largely dependent upon the agency of the parcels' post for obtaining seeds, the rate for such packages containing imported seeds be placed on the same level as that for South African agricultural produce."

Mr. Blaker seconded.

The resolution was carried.

PURITY OF SEEDS AND FERTILISERS.

Rev. Jas. Scott (Natal) moved to re-affirm:—

“That this Conference continues to urge upon all South African Governments the necessity for the framing of a law which will assist in the securing of artificial fertilisers of standard quality, and of seeds true to name, free from impurities, and of good germinating power; and that provision be made in such law for proper inspection of these goods.”

Mr. McDermott (Cape) said that there was already a law in force in the Cape Colony at least.

Mr. Du Toit (Cape) explained the Cape law on the subject, stating that merchants had the opportunity of registering their seeds as possessing a certain standard of purity.

Mr. Burt-Davy said that a law on somewhat similar lines had just been passed by the Transvaal.

Mr. Evans (Natal) said that there was no law on the subject in force in Natal, but the Department of Agriculture had been in the habit for some years past of collecting samples of fertilisers from merchants, analysing them, and publishing the results of those analyses, with prices, every year, as a guide to the farmer.

Mr. Burt-Davy said that a sample of Boer manna seed which he had tested this season contained 49,000 “mist-breede” seeds; whilst a sample of paspalum seed showed only 4 per cent. germination in 19 days.

The resolution was unanimously adopted.

S.A. CENTRAL SHOW.

Mr. C. G. Lee (Cape Colony) moved:—

“That this Conference favourably considers the application of the Port Elizabeth Agricultural Society for the holding of the first central South African Agricultural Show in that town.”

He said the Port Elizabeth Agricultural Society was the first in South Africa to hold an annual agricultural show, and their action had been continued consistently.

Rev. Mr. Scott (Natal) seconded the motion.

Mr. W. M. Brown (Cape) also spoke in favour of the resolution, holding that the Port Elizabeth Society was entitled to the honour from the fact of its being the oldest society in South Africa and the birthplace of agricultural societies.

Mr. Poulteney (Transvaal), whilst acknowledging the claims of the Port Elizabeth Society as put forward by Mr. Lee and Mr. Brown, nevertheless asked them if they thought Port Elizabeth was sufficiently central. He thought a central show held at Port Elizabeth would be a failure, be-

cause of the geographical position of that place. He considered Johannesburg would be the better place to hold the show.

Mr. Hunt (Transvaal) thought that no central show ought to be held until South Africa was more clear of disease. (Hear, hear.) He further supported Mr. Poulteney's view that Port Elizabeth was not a suitable place in which to hold the show, and that Johannesburg was the best centre for the purpose.

Mr. E. W. Evans (Natal) moved as an amendment that last year's resolution, to the effect that arrangements be made for the holding of a South African National Show, without specifying any particular place, be re-affirmed.

Mr. Lee, in replying, said that his society did not wish to force matters, but they wanted to be in a position to make the extensive preparations which would be necessary for such a large show.

Mr. Evans' amendment was carried.

DATES OF SHOWS.

The following dates for the holding of the principal agricultural shows were confirmed:—Western Province, 1st, 2nd, and 3rd March; Port Elizabeth, 15th to 18th March; Bloemfontein, 22nd, 23rd, and 24th March; Johannesburg, 30th March to 2nd April; Maritzburg and Durban, in June or July.

BRUSSELS EXHIBITION.

Mr. Nicholson (Secretary) moved:—

"That this Union shall endeavour to secure the forwarding of a representative collection of South African agricultural products to the Exhibition to be held in Brussels in 1910."

Upon the motion of Mr. Clayton (Natal) it was decided to pass on to the next business.

EXPORT OF PRODUCE.

Mr. Poulteney (Transvaal) moved:—

"That this Union welcomes the attempts which are being made by the various Governments to carry out experiments whereby the products of South Africa may be introduced to oversea consumers, and hopes that further efforts may be made in this direction."

Mr. W. F. Clayton (Natal) seconded.

The resolution was carried.

MEALIES FOR EXPORT.

Mr. Moon (Natal) moved:—

"That with a view to the increased export of farm products, it is necessary that ample shipping accommodation should be provided for the transport of such produce as may, from time to time, be collected

at the various ports; thus preventing expensive delays, and the loss of good markets."

In speaking to the resolution, Mr. Moon said there was no excuse for wet mealies going from South Africa. He was sorry to say that nearly all the wet mealies came from the Transvaal and the Orange River Colony. The grader should see that no mealies went away that were not dry. They could grow mealies in South Africa second to none. He hoped that the Governments would see that wet mealies were not exported, because it was ruining the industry. In his opinion the examination and grading of grain for export should be done at the border.

Mr. Burman (Natal) said that no wet mealies had been sent from Natal.

The resolution was unanimously adopted.

EXPORT OF MUTTON.

Mr. E. W. Evans (Natal) moved:—

"This Union is of opinion that, in view of the increase of sheep in South Africa, all Governments should be asked to take into consideration the advisability of establishing abattoirs at the various ports for the purpose of encouraging, and providing for, the export of mutton."

Mr. W. F. Clayton (Natal) seconded.

Mr. Hunt (Transvaal) moved, as an amendment, that the words "at the various ports" be deleted. The carriage of stock for long distances—for example, from the Transvaal and O.R.C.—was certainly not conducive to the best results as regards meat, and he considered that the abattoirs should be nearer the live-stock producing centres.

The amendment was carried by 19 votes to 4.

RE-ORGANISATION OF THE UNION.

Mr. C. G. Lee (Cape Colony) moved:—

"That this Conference is of opinion that the time has arrived when, in the best interests of the farming community, the constitution of the Union be so amended as to provide for the creation of a central representative body, so equipped as to be in a position to actively promote the welfare and protect the interests of the entire agricultural community; further, that the Union deems it desirable that a South African Chamber of Agriculture should be formed."

It was decided to leave the matter in the hands of a special committee to discuss and report upon at a later stage of the proceedings.

EPIZOOTIC LYMPHANGITIS.

Mr. Van Rooyen (Natal) moved:—

"That the Government take amended steps for the prevention of the disease, which has broken out among mules, called lymphangitis."

He said he understood from the Veterinary Department that this

was one of the most dangerous contagious diseases. He asked that representatives of the Veterinary Department, or the Minister of Agriculture, might address the Conference on the subject.

The Hon. W. A. Deane said that epizootic lymphangitis had been in the Colony since the outbreak of the war. The disease was not incurable but it was a difficult one to deal with. An operation was necessary in the early stages of the disease, and this did not always prove effectual. The incubation period was something like six months. A slight abrasion of the skin was sufficient to provide a means for the introduction of the disease.

Mr. Pott (Transvaal) asked that one of the veterinary surgeons present might describe the early symptoms of the disease. He had been told that it was allied to glanders, the symptoms of which were easily recognised by farmers.

Mr. Gray (Chief Veterinary Surgeon, Transvaal), said that in the Transvaal they had had eight outbreaks during the last year. The disease could be controlled by quarantine methods.

Mr. W. F. Clayton (Natal) remarked that he had an isolated case of lymphangitis on his farm, the horse concerned in which had not been eight hundred yards away from the stable or come into contact with other animals. He considered that the tick bird was responsible in his own case.

Mr. Evans (Natal) said that if stamping out were adopted, compensation should be made for animals shot by order of the Government. The outbreak of the disease was most serious, in consideration of the transport difficulties which were already being experienced.

Mr. Bazley (Natal) proposed, as an amendment, that the tick bird be removed from the official list of protected birds and steps taken to ensure its destruction.

Mr. G. D. Alexander (Natal) hoped they would not vote, without reflection, in favour of Mr. Bazley's amendment. It was a serious question.

Mr. Deane said the law in Natal provided for the destruction of infected mules without compensation. It was perhaps unfortunate that there should be no compensation, but it acted as a stimulus to farmers to fight the disease. He considered the disease should be placed on the same level as lung sickness. (Hear. hear.)

Mr. Borthwick (Chief Veterinary Surgeon, Cape), said the trouble was that a mule often appeared to recover and was allowed to go among other animals and transmit the disease to them.

In reply to Col. Crompton, Mr. Power (Chief Veterinary Surgeon, Natal), said he did not think veld would remain infected long, but a stable would remain infected for a very considerable time. In reply to Mr. Wiltshire, he said that the disease was very similar to farcy; ulcers

appeared on the body, especially down the inside of the hind legs. It was rather difficult to distinguish between the two diseases, microscopic examination being necessary. This examination would be made by the Veterinary Department if farmers would send in slides.

The resolution was carried unanimously.

EAST COAST FEVER.

Mr. Alexander (Natal) moved:—

“That this Union is of opinion that the various Governments of South Africa should be approached with a view to securing united action for the eradication of East Coast Fever.”

In moving, Mr. Alexander said that in 1904, on the appearance of the disease in the Transvaal, a large meeting was held in Pretoria to discuss the question. At the meeting there were 144 delegates present. It was decided that the best method of dealing with this disease was that of stamping out, with united action for the purpose on the part of all the Governments of South Africa. He had obtained figures from all the South African Administrations, which showed that since 1904 Basutoland had spent £7,790; Natal, £227,519; Transvaal, £260,445; O.R.C., £24,000; Cape Colony, £90,000. He reckoned that the loss to South Africa through the ravages of the disease, apart from these monies expended in support of preventive measures, had been quite a million sterling. If the various Governments had taken the matter in hand in 1904 there would not now be a single case of East Coast Fever in South Africa. If the Cape and O.R.C. thought they were going to keep the disease out under present circumstances they were very much mistaken. Natal was at present a menace to South Africa. He thought that the Governments of South Africa ought to realise that money must be spent for the purpose of stamping out, with conjoint action. A competent board should be appointed for all South Africa to deal with the disease, and to decide where the money was to be spent. Under existing circumstances the disease was going to wipe out the stock of South Africa, and it was going to cost twenty times as much later on as it would cost now. The first thing to aim at was to bring pressure to bear on the various Governments to recognise that united action must be taken. The sum of money necessary must be put up, and that money must be administered by a central board of competent men, and not be placed in the hands of a lot of local committees. It was a question for union.

Continuing, Mr. Alexander said the question of compensation was one that should be arranged upon some system by which the man who takes the trouble to keep his cattle clean, fence his farm, and prevent his cattle from straying should be paid the maximum compensation, and only the minimum of compensation should be given to the man who had taken little or no trouble with his cattle. There was another reason why united

action should be taken. He referred to the fact that the disease was sometimes spread by means that were very sinister. There were far too many cattle buyers about. (Hear, hear.) He had no hesitation in saying that this disease was being maliciously spread; the Veterinary Department could show them that the disease had been so spread. Cattle buyers should be abolished. If the disease jumped into the Cape Colony it would run as it had run in Natal, and if the Cape Colony got the disease, it would mean ruin to South Africa.

Mr. Evans (Natal) said that at the present moment, with the exception of about two counties, the whole of Natal was infected. He remarked that the disease made extraordinary jumps, which, in Natal at least, were probably caused by natives. Perhaps in Natal they were more badly situated than in the Cape or the Transvaal, but at the same time these latter Colonies have solid native territories also. If the disease jumped the Umzimkulu they would not be able to prevent it from reaching Basutoland and the other native territories. He spoke of the paralysis of progress which is one of the consequences of the disease, a matter which Mr. Alexander had not referred to. Joint action was necessary between the Colonies. Referring to the nervousness of the whites in dealing with the natives in connection with the disease, there had been a differentiation between whites and blacks in the matter of administering regulations, and this was a great mistake. (Hear, hear.) If Natal acted in conjunction with the other Colonies, this would be done away with. The Natal Government had been impecunious—which, however, they could not help. They had tried to escape the cost of compensation. He maintained that it was absolutely impossible to temperance cattle and move them over clean districts with safety. (Hear, hear.) He held that the Natal Government had often been responsible for the spreading of the disease by this practice.

Mr. Nicholson (Transvaal) said that all credit was due to Natal as the first Colony to offer help to the Transvaal to stamp out the disease. It was the duty of the Union Government to take the matter in hand. There should be taxation, if necessary, for the purpose. The Transvaal was a rich Government, and it should be called upon to pay for the folly committed in the early days.

(To be continued.)

Eggs from hens usually produce stronger chicks than do the eggs from pullets.

Earthnuts and Their Culture.

By W. R. BEATTIE,

*Assistant Horticulturist, U.S. Bureau of Plant Industry.**

BOTANICALLY the earthnut belongs to the same group of plants as do the beans and peas, but it possesses the character of maturing its fruit or nut beneath the surface of the soil rather than above ground, as do most other leguminous plants. The technical name of the earthnut is *Arachis hypogea*, the name indicating the characteristic habit of the plant to mature its fruits underground. The small yellow flowers of the plant are borne in the little packet where the leaves are attached to the stems, and as soon as pollination has taken place the visible portion of the flower fades and falls, after which the short, thick stem that supports the lower portion of the flower elongates and the sharp-pointed ovary is thrust downward into the soil, where the pod develops. Should the ovary fail to reach or penetrate the soil no pod will be formed.

SOIL AND CLIMATIC REQUIREMENTS.

The soil best suited to the earthnut is one of a sandy, loamy nature, preferably light or greyish in colour rather than dark. Soils that are dark and those carrying a considerable percentage of iron or other mineral are likely to stain the shells of the earthnuts, thus rendering them less desirable for the trade. For agricultural purposes, however, the staining of the shells is of little consequence, as it does not materially injure them for stock-feeding. In fact, soils that contain considerable clay and lime or are loamy in character produce heavier nuts and sometimes greater yields than do lighter soils. As a rule the earthnut does best on a sandy loam with a well-drained clay subsoil, but the crop may be grown under a wide range of soil conditions. Soils that become hard or compact are not adapted to earthnut growing, owing to the inability of the pod stems or "pegs" to penetrate the surface.

Soils that are poorly drained or sour are not suited to the earthnut. The ideal soil consists of a sandy loam containing a reasonable amount of humus, or vegetable matter, together with an abundance of lime. A soil having a suitable mechanical consistency is the first essential. Soils lacking in fertility can be improved by a proper cropping system or by the judicious use of manures.

* Condensed from Farmers' Bulletin No. 356 of the United States Department of Agriculture, from which also the illustrations are reproduced. We publish this article in response to enquiries received from readers with regard to the cultivation of earthnuts.—ED.

The climatic requirements of the earthnut are a long season without frost, a comparatively light rainfall during the growing period, abundant sunshine, and a high temperature. The earthnut is slightly more susceptible to injury from frost than the common bunch bean and requires a somewhat longer season for its development. The Spanish earthnut will mature in ninety days under the most favourable conditions, but one hundred and ten to one hundred and twenty days should be allowed. The large-podded varieties require a longer period for best results.

PREPARATION OF THE SOIL.

TIME FOR PLOUGHING.

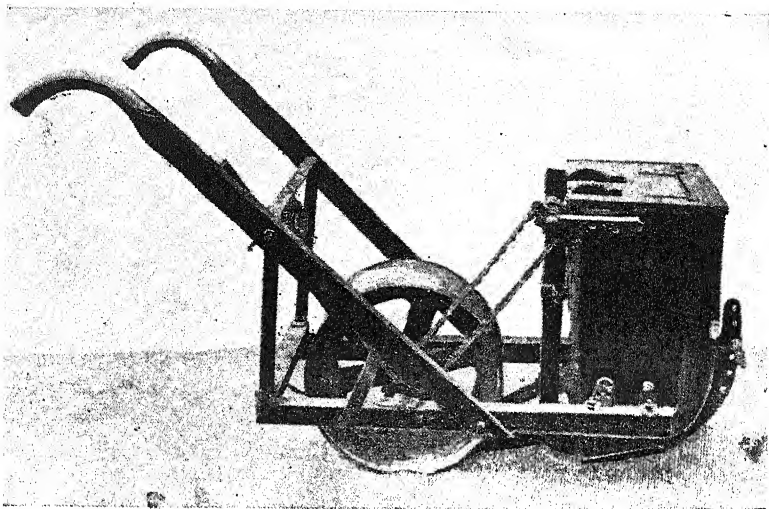
The time for ploughing the land to be planted to earthnuts will depend somewhat upon its previous treatment. If the land has been in mealies the season before and a crop of crimson clover was sown at the time the maize was laid by, it will be desirable to plough the land just before the clover blooms in order to get the greatest benefit from it as a green manure. If the land is in sod it will be desirable to break it during autumn or winter. If there is no crop on the land the ploughing need only be done in time for planting, or rather, but a short time before planting, in order to allow the soil to settle. Where a crop of crimson clover is turned under, the soil should be thoroughly harrowed and rolled in order to obtain a compact seed bed and to retain moisture.

DEPTH OF PLOUGHING.

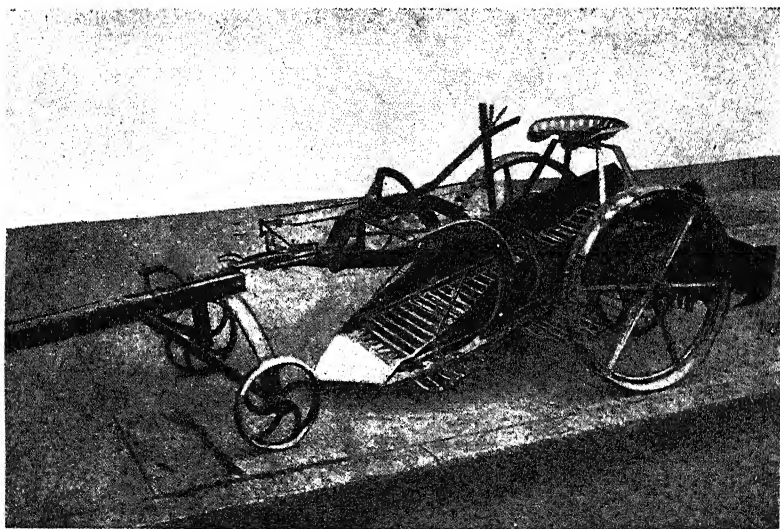
The depth of ploughing will depend somewhat upon the character and depth of the surface soil. On sandy soils that are underlaid by a clay subsoil it would be unwise to bring a very great quantity of the subsoil to the surface. If the surface soil is not of sufficient depth, it should be increased by ploughing a very little deeper each year until a sufficient depth is reached. As a general rule the depth of ploughing for earthnuts should not be quite so great as that for mealies in the same locality. From 5 to 7 inches of loose soil will be sufficient for the growing of all varieties of earthnuts. Subsoiling may prove beneficial on soils having insufficient drainage.

PREPARATION FOR PLANTING.

When the land is ploughed but a short time before planting it should be harrowed within a few hours after ploughing in order to prevent loss of moisture. On loose, sandy soils that are reasonably free from weeds or grass it is often possible to dispense with the regular ploughing and cut the land with a disc harrow or disc plough. A tool that is especially adapted for this purpose is shown herewith. This implement both cuts and turns the soil, leaving it in fine condition, so that it is readily prepared for planting.



One-Horse Earthnut Planter.

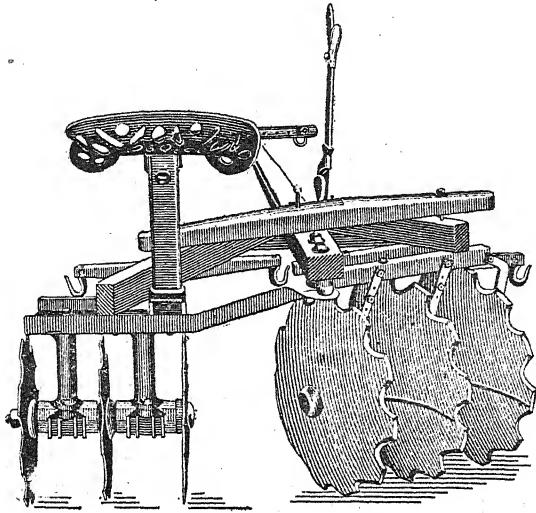


Machine Potato Digger adapted for Harvesting Earthnuts.

EARTHNUTS AND THEIR CULTURE.—I.

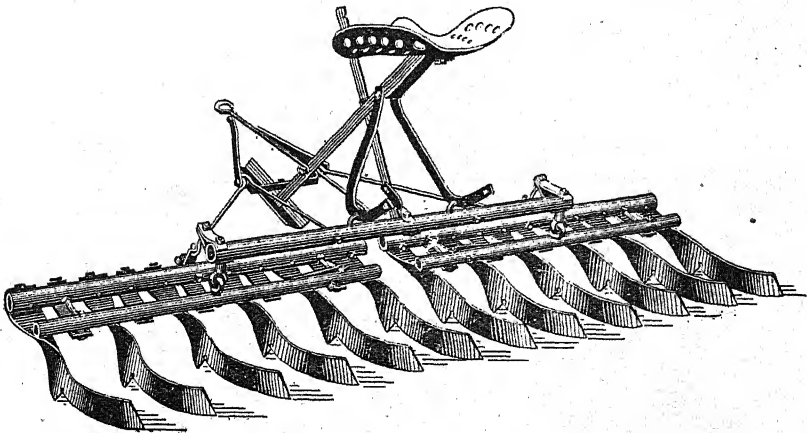
(See Article.)





DISC PLOUGH ADAPTED FOR FITTING LAND.

Where ploughing is necessary in order to turn under sod, clover, or weeds a tool of the type shown in the second illustration is desirable for smoothing and pulverizing the soil afterwards. This harrow is superior to the ordinary smoothing harrow in that it turns, crushes, and levels the soil in one operation. By means of a level the cutting blades can be set to any depth, and the weight of a boy or light man upon the seat is sufficient to secure good work. If the soil is very loose it may be necessary to roll or drag thoroughly before planting.



HARROW ADAPTED FOR SMOOTHING AND PULVERISING LAND.

Under ordinary circumstances level culture should be practised, but where the drainage is poor it may be advisable to throw up slight ridges upon which to plant earthnuts; this is especially desirable during a season of excessive rainfall. When ready for planting, the soil should be in the same general condition as that prepared for a crop of snap or bunch beans. Thorough preparation of the soil is profitable for all crops, and especially for earthnuts. If the soil can be harrowed once a week for three or four weeks before planting, most of the weeds that would otherwise injure the crop will be destroyed.

FERTILISERS AND PREPARATORY CROPS.

CROPPING SYSTEM AND GREEN MANURES.

Earthnuts should be grown in rotation with other crops rather than as a speciality. The cropping system will depend somewhat upon the area of other crops grown, but the arrangement should be such that the land will be planted to earthnuts one year in each three or four. A good rotation is mealies the first year with cowpeas planted between the rows at the time of the last cultivation; the next season plough under the remains of the cowpeas and plant the land to earthnuts; as soon as the earthnuts are harvested sow the land with rye and use as a winter pasture; plough under the rye during the springtime and plant cowpeas, using the peas as a hog pasture during the autumn; then return to mealies the following year.

Another plan would be to devote the land one year to sweet potatoes instead of cowpeas, or to a crop of early Irish potatoes followed by cowpeas or crimson clover. In this rotation stable manure should be applied to the crop of mealies, and the commercial fertilisers with the earthnut and potato crops. Earthnuts should invariably follow some well-cultivated crop which has been kept free from weeds.

THE USE OF STABLE MANURE.

Stable or barnyard manure should not be used as a fertiliser the same year that the land is planted to earthnuts owing to the great number of weed seeds that are contained in the manure. The use of manure also has a tendency to cause the plants to produce abnormal tops and a large percentage of poorly filled pods, known to the trade as "saps" or "pops." The proper time for applying stable manure is with the crop grown the previous season, thus giving it time to become incorporated with the soil and reduced to the proper condition for the earthnut crop.

COMMERCIAL FERTILISERS.

The earthnut responds to the use of commercial fertilisers. However, a reasonable amount of humus in the soil is essential. If properly handled the earthnut crop is not exhaustive of soil fertility; in fact, the plant is a great nitrogen gatherer as may be observed by the large num-

ber of nodules upon the roots. On the other hand, if the entire plant, including the root, is removed and no part returned to the soil the earthnut becomes almost as exhaustive of soil fertility as cotton or mealies. By feeding the straw and other refuse from the crop to cattle, hogs and work animals and applying the manure thus obtained to the land the fertility may be retained or even increased.

On soils that are adapted to the production of earthnuts it will not be necessary to employ commercial fertilisers in large quantities. Soils abundantly supplied with nitrogenous matter will, especially during a rainy season, produce an overgrowth of vine and poorly filled pods.

A commercial fertiliser adapted to the production of either Irish or sweet potatoes is as a rule suited for the growing of earthnuts. A mixture which contains from 2 to 4 per cent. of available nitrogen, 5 to 7 per cent. of available phosphoric acid, and 6 to 10 per cent. of potash, is desirable; this should be applied at the rate of from 200 to 1,000 pounds to the acre, according to the needs of the land. Most growers follow the practice of scattering the fertiliser in a narrow strip where the row is to be planted, but for the general good of the land it is a better plan to sow or drill the fertiliser broadcast. In all cases it is important that the fertiliser be thoroughly mixed with the soil.

IMPORTANCE OF LIME IN THE SOIL.

In order to insure the proper filling and ripening of the pods, earthnuts require an abundance of lime in the soil. Where the soil is of a calcareous nature, containing limestone, shells, or lime in its active form, it may not be necessary to make a regular application, but on soils that are deficient in lime or inclined to be in the least sour, from 1,000 to 2,000 pounds of fresh burned lime should be applied to an acre every four or five years. The lime should not be put on at the same time as the commercial fertilisers, but rather during the previous autumn, or at the time of ploughing the land. Wood ashes are desirable as a fertiliser for earthnuts, as they contain both potash and lime. Unleached wood ashes may be applied broadcast at the rate of 1,000 to 1,200 pounds, 25 to 30 bushels, to the acre.

The presence on the land of certain weeds, such as the common sorrel and the sedges (which have three-cornered stems), indicates sourness and insufficient drainage; to correct this an application of lime will be necessary in addition to ditching or tile draining. Lime should be used on land that is to be planted to earthnuts, unless it is definitely known that there is an abundance of it already present.

THE EARTHNUT AS A NITROGEN GATHERER.

The earthnut plant, in common with other leguminous plants, has the power of collecting the free nitrogen of the atmosphere and storing it in little nodules upon its roots. For this reason the earthnut is one of

the more desirable of our soil-renovating and soil-improving plants. It should be borne in mind, however, that in order to benefit the soil the nitrogen so gathered should not be removed, but that the main portion of the roots should be left in the soil. Fig. 4 shows the root of an earthnut plant which is abundantly covered with the nitrogen-storing nodules.

THE SEED AND ITS SELECTION.

IMPORTANCE OF PLANTING GOOD SEED.

A good grade of seed is just as important with the earthnut as with mealies, wheat, or other crop. There is perhaps no other farm crop except maize that is so greatly influenced by the character of seed planted as the earthnut. The very best earthnuts of the previous season's crop should be selected for seed, and of these only the most mature and perfect nuts should be used. Seed should be saved only from well-ripened and mature plants and should be properly cured and kept dry during the winter months. Good seed produces a more even stand of plants, which in itself returns a greater yield.

IMPROVEMENT BY SELECTION.

The seed should not only be selected from plants that are mature, but from those producing a large number of mature pods as well. By doubling the number of well-filled pods on each plant the yield for each acre will also be doubled. Many millions of bushels have been added to the maize crop of the country simply through the selection and improvement of seed.

What has been done with mealies is possible with the earthnut, and where we now have an average yield of 34 bushels to the acre it is reasonable to expect this to be increased to 50 or 60 bushels through seed and cultural improvements.

PLANTING SHELLED OR WHOLE SEED.

In planting the large-pod varieties it is desirable for several reasons that the seed be shelled. In the first place the planting machines now in general use are adapted to handling the shelled seed only. Second, when planting whole pods there is always a doubt regarding their being well filled, and a poor stand may result. Third, pods containing two or more seeds will produce more than one plant in a hill, causing a waste of seed and a crowding together of the plants. Fourth, whole seed is slower in germinating than shelled seed. With the Spanish variety the case is quite different, as several of the machines will handle the whole nuts, the pods are invariably filled, the crowding together of the plants is no great disadvantage, and the few days extra time required for germination is of little consequence.

Virginia nuts intended for seed should always be shelled by hand, but the Spanish are sometimes shelled by machinery, although their

germination is invariably injured when so handled. Many growers of the Spanish earthnut practice soaking the unshelled nuts in water previous to planting. Soaking for a few hours will hasten germination, but if for any reason the seed can not be planted immediately it will be lost. Shelled seed should never be soaked before planting.

TIME AND METHODS OF PLANTING.

The time for planting earthnuts is in the spring after the soil has become thoroughly warm. In order to secure a good stand, the seed should not be put in the ground until there is sufficient warmth to germinate it quickly. As a rule earthnuts should be planted a trifle later than mealies and beans. The Spanish variety may be planted somewhat later than the Virginia type, as it requires less time to complete its growth.

DISTANCE TO PLANT.

A common distance between rows is 36 inches, but this varies somewhat according to the soil and variety. For the Virginia Runner variety on good soil the distance between rows should be at least 36 inches, and 12 inches between the plants in the rows. Virginia Bunch earthnuts may be in rows as close together as 30 inches, and 7 to 9 inches apart in the rows. The Spanish and Tennessee Red varieties are planted in rows from 28 to 36 inches apart and 7 to 9 inches apart in the rows, according to the fertility of the soil. On rich soils, where the spread of vine will be great, the maximum distance between rows as well as between plants in the row should be allowed.

QUANTITY OF SEED REQUIRED.

The quantity of seed earthnuts required to plant an acre will depend somewhat upon the distances of planting. As a rule one-half bushel of shelled Virginia nuts will plant an acre. One and one-half pecks of shelled Spanish earthnuts, or 2 bushels in the pods, are required for an acre. The greater the care exercised in planting, the smaller will be the waste of seed, and economy is quite an object when planting specially-selected or high-priced seed.

DEPTH TO COVER THE SEED.

The depth to which the seed should be covered will depend somewhat upon the character of the soil. On heavy soils three-fourths inch to 1½ inch will be sufficient, while on light sandy soils 1½ to 2 inches may not be too deep.

TOOLS AND METHODS OF PLANTING.

Earthnuts are generally planted in rows that are cultivated in one direction only. Some growers follow the practice of first marking the land with an implement similar to the ordinary mealie marker. Others open a furrow with a one-horse plough, then after the fertiliser has been

distributed in the furrow the plough is again used and a slight ridge thrown up. There is now on the market a tool of the type shown in Fig. 5, which sows the fertiliser, throws up a slight ridge, and at the same time indicates the position of the next row. If desired, this machine can be supplied with a seeding device, which will complete the planting at one operation.

The greater portion of the earthnut crop is planted with the one-horse planters of the type shown. These machines are similar in many respects to a cotton planter; in fact, a cotton planter may be adapted to planting either the whole Spanish or the shelled Virginia earthnuts with very little trouble or expense. The ordinary earthnut planter costs in the neighbourhood of \$15 in most localities in the United States.

GENERAL CULTIVATION.

METHOD OF CULTIVATION.

Cultivation of the earthnut crop should begin as soon as the rows can be followed and continued until the vines begin to occupy the ground. The work of cultivation should be pursued very much the same as for mealies, beans, and all similar crops. Frequent shallow cultivation that will keep the soil loose and prevent the loss of moisture is essential. Shortly after rains the surface soil should be stirred and during dry weather a dust mulch maintained. After the first cultivation it will be desirable to work the soil toward the rows to provide a bed of loose earth in which the pods may form.

After the earthnuts begin to "peg," or form pods, they should not be disturbed or given further cultivation. The old idea that the blossoms of the earthnut must be covered is erroneous, although growers frequently allow considerable soil to be thrown over the vines during the final cultivation. For the last cultivation it is a common practice to employ a tool that will both throw the soil toward the rows and leave a furrow in the middle of the alley to carry off water during heavy rains.

TOOLS ADAPTED TO CULTIVATING EARTHNUTS.

Most implements that are adapted to the cultivation of maize or cotton will be found suitable for handling the earthnut crop. For the first two or three cultivations a spring-tooth riding cultivator is desirable, while for the latter workings the same implement can be used by changing the spring teeth for regular cultivator shovels.

Some growers follow the practice of running a light roller over the plants after the final cultivation, the object being to flatten the stems upon the ground in order that the little pods forming on the extremities of the stems may reach the soil. This practice may increase the yield, but it will also increase the percentage of "saps," or unfilled pods, and it is doubtful if anything is gained by the practice.

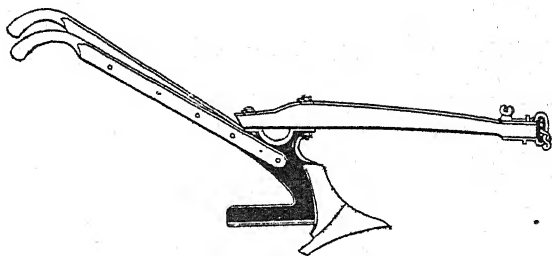
HARVESTING.

PROPER TIME FOR DIGGING THE CROP.

No fixed rule can be given by which to determine when to remove the earthnut crop from the ground, and each grower must be his own judge in the matter. In general practice the growers aim to dig before the first frosts, in order that the earthnut vines may have greater value for stock food. To the southward, where frosts do not appear until quite late, the vines assume a yellowish appearance during the latter part of the season, which indicates the ripening of the nuts. If digging is deferred too long, the first-formed nuts are likely to burst their shells and start growing; this is especially true if there is a period of rainy weather late in the season. The aim should be to dig at the time the vines have upon them the greatest number of mature nuts. Where a large acreage is grown it will be necessary to begin harvesting as soon as the earliest nuts are ready, in order to complete the work before unfavourable weather sets in.

METHODS EMPLOYED FOR LIFTING THE PLANTS.

Under ordinary circumstances the earthnut vines are ploughed from the ground with a one-horse turning plough and afterwards separated from the soil by hand. Many growers employ either a two-horse plough similar to that frequently used for digging potatoes or a turning plough with the mold-board removed to prevent a furrow being turned. A digger of this type is shown herewith. Behind the digger or plough a



PLOUGH TYPE OF EARTHNUT DIGGER.

gang of workmen shake the vines and nuts free from the soil and throw them in small bunches.

It has been found by experiment that the regular machine potato digger drawn by two or three horses driven by one man will dig from 8 to 12 acres a day and do the work in a much cleaner and better manner than the old plough and hand method. This machine not only removes the earthnuts from the ground in a more perfect manner but also shakes off the soil and leaves the vines lying loosely upon the surface of the ground. By the hand method a great many pods become detached from the vines, while with the machine potato digger scarcely a pod is lost.

The cost of a machine potato digger is about \$100 (£30), but with proper care it should last many years; besides, one machine would do the work for two or more growers. Almost any of the machine potato diggers may be used for digging earthnuts, but where the vines of the "runner" nuts are exceptionally heavy there may be some difficulty in getting the vines through the machine. This difficulty may be overcome by providing discs or cutters to cut away the ends of the vines in front of the machine.

Special machines are now being offered which are intended to dig, clear, and bunch the earthnuts. By setting any of these machines to the proper depth it is possible to sever the main root of the earthnut just below where the pods are formed and thus leave a considerable proportion of the accumulated nitrogen in the soil. It is estimated that the nitrogen left in the soil by this system has a fertilising value of from \$3 (12s. 6d.) to \$4 (16s. 8d.) an acre.

CURING PROCESS AND CARE OF CROP AFTER DIGGING.

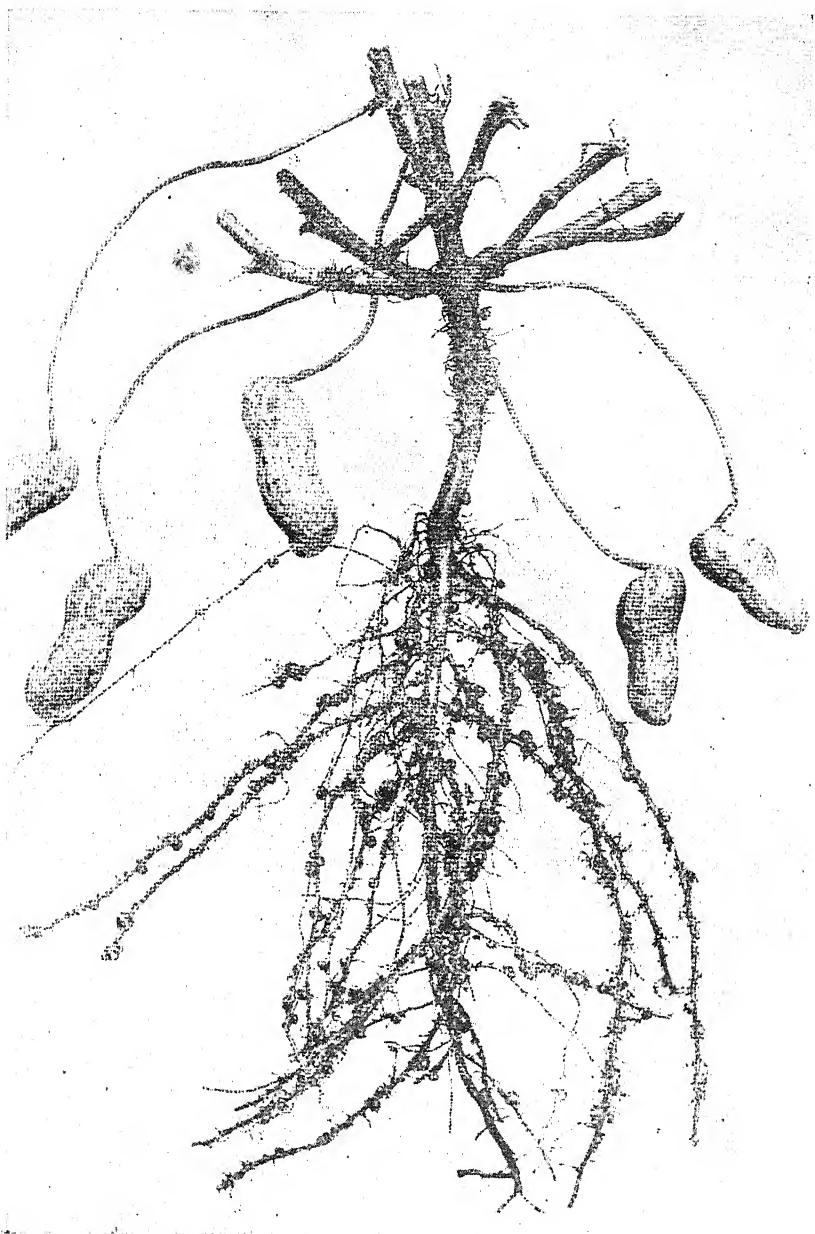
After the earthnut vines are loosened from the soil they are allowed to lie either spread upon the ground or in small bunches for three or four hours, and are then placed in small stacks around a central stake to cure. If the nuts are allowed to lie exposed to the weather for any length of time after digging, the pods become discoloured and lose in weight.

A better grade of earthnut hay will be secured if the vines are placed in the small stacks as soon as the leaves and stems are thoroughly free from dew or other surface moisture. Most growers follow the practice of putting the nuts in shock the same day they are removed from the soil, or those dug during the morning are stacked in the afternoon and those dug later in the day are stacked the following morning as soon as they are free from dew; however, any dew or rain will discolour the pods.

The essentials in caring for the crop during the curing period are that the earthnuts be kept in small stacks, given an abundance of air, and protected from both the weather and injury from animals. Owing to the fleshy nature of the stems they cure quite slowly and are liable to mildew if placed in large lots.

In order to produce a good grade of earthnuts for the market it is necessary to cure them in small stacks built around a central stake or pole. The supply of stakes should be ready in advance and may be kept for use from year to year. These stakes should consist of split or round poles about 3 or 4 inches in diameter, 7 feet in length, and sharpened at both ends. For setting the stakes in the ground a pointed bar of iron or a crowbar with which to make the holes is necessary. The stakes should be set in the ground to a depth of 12 to 18 inches and well stamped to make them firm and solid.

Before starting the shock one or two pieces of lath are nailed across



EARTHNUTS AND THEIR CULTURE.—II.

Roots of earthnut vine, showing the value of this plant as a nitrogen gatherer.
The nodules on the roots are formed by the bacteria which collect the nitrogen.

(See Article.)

the stake a few inches from the ground, in order to prevent the earthnuts coming in direct contact with the soil. In starting to build the shock a few vines are laid across the pieces of lath and the shock then built up by successive layers of vines, the pods being kept well to the centre and the tops to the outside. The stems should have sufficient outward slope to the shed water. Occasionally a few vines should be hung around the stake in order to tie the shock together. By this method the pods will lie near the centre and around the pole, where there is an upward circulation of air and general protection. When the shock has reached the desired height, a bunch of vines is rolled together and pressed down over the point of the stake to form a top, or a little grass or weeds may be used for this purpose.

The majority of growers follow the practice of placing the shocks singly in rows in the field where the crop is grown; others arrange them in groups of from four to ten while some growers haul the crop to a stacking yard, where the shocks are built closely together.

Storage in barns is not advisable when curing earthnuts for market, but where the entire plant is fed to stock the crop may be handled in much the same manner as cowpeas, velvet beans, or a heavy growth of clover.

PICKING AND CLEARING.

Earthnuts for market should be cured in the shock at least three or four weeks before picking. If the weather is dry and windy immediately after harvesting, the curing process will be quite rapid, but should the weather conditions be unfavourable during this period the pods will ripen more slowly. Too rapid curing is not desirable, as the pods are likely to shrivel and discolour. Earthnuts should not be picked from the vines until the pods have become dry and the nuts firm and nutty, with the immature ones more or less shrunken. As a rule very little is to be gained by early marketing, and a better grade of earthnuts will be secured if picking is deferred until late autumn. If the pods are not well protected in stacking, many will be destroyed by the common blackbird. In some sections it is necessary to pick as early as possible to prevent heavy loss from the ravages of field mice and rats while the earthnuts are in the shock.

If earthnuts are not well stacked the pods are liable to become discoloured by the heavy fogs and driving rains of late autumn. The stacks should not be opened or the vines handled during wet weather.

PICKING BY HAND.

The standard of excellence in the earthnut markets is always based upon hand-picked stock. Earthnuts that are picked by hand now bring a higher price than those picked by machinery, but with the present scarcity of labour and rapid movement in earthnut-picking machinery

the time will soon come when a uniform price will be paid for a given quality of nuts regardless of how the picking is done.

USE OF MACHINES FOR PICKING.

Two types of machines have been employed for picking earthnuts from the vines, and most of the work done by them has been quite satisfactory. A cylinder machine similar to a regular grain separator, except as to size, has been used for several years, especially in the districts where the Spanish variety is extensively grown. The principal objection to all the cylinder machines is the tendency to break the pods and both shell and injure the nuts. By running the cylinder quite slowly, say at 400 revolutions a minute, and feeding properly, it is possible to thrash earthnuts by using a cylinder machine with a very small percentage of loss from breakage. Pods that are merely cracked or that have what the growers term "oyster mouths" will not keep for a long period but become rancid or are injured by small insects while in storage.

There is a machine in use which works upon an entirely different principle from the cylinder machines and which does not break or injure the pods. In this machine the picking is done by dragging the vines over a horizontal wire mesh, and at the same time brushes act on the lower side of the wire screen to remove the nuts. Very little power is required to operate this machine, two complete outfits being run at once by a 5-horse power gasoline engine. The capacity of this machine is from 300 to 500 bushels a day. In addition to removing the pods from the vines the machine has the usual cleaning arrangements and a device for removing the small stems from the pods, delivering them in a condition suitable for the cleaning factory.

CARE OF EARTHNUTS AFTER PICKING.

At no time after the curing process should the earthnut pods be exposed to water, or even dampness, as the shells invariably become darkened and discoloured by the addition of moisture. When properly cured the shells will be covered with a fine, dry dust, and where this dust becomes moistened it adheres and forms a brownish spot. If the earthnuts show the least trace of dampness after their removal from the vines, they should be spread on a floor or stored in a well-ventilated building until thoroughly dry. Many of the larger growers have provided narrow cribs similar to those employed for the storage of mealies, and the earthnuts are kept in bulk until sold. When the pods are thoroughly dry they may be put into bags as they come from the machine, and either hauled direct to the cleaning factory or stored in small lots.

CLEANED VINES AS STOCK FEED.

The earthnut vine or straw from which the nuts have been removed is of considerable value for feeding purposes. Where the earthnuts are

picked from the vines by hand the stems become broken and the greater portion of the leaves is lost, but where machines are used for picking it is possible to save the straw in fairly good shape. If the vines are carefully handled during the curing process and then put in barns or stacks that keep out rain, the straw when delivered from the thrasher will have a feeding value about equal to clover hay. If the vines are bright and clean after the pods have been removed they can either be sold or fed to farm animals, and they will in this way partially pay for the cost of planting and cultivating the crop. Some growers employ a baling press and bale the straw as it comes from the thrasher in order that it may be more easily stored and also be available for marketing.

(To be continued.)

Do not become weary in well-doing. Well-doing means looking out for your own interest and the poultry.

Legislation such as is referred to in Act No. 29, 1907, having been enacted and promulgated in the Protectorate of German South-West Africa, prohibiting the exportation of ostriches and ostrich eggs, the exportation of ostriches and ostrich eggs from Natal to that Protectorate is now permissible.

PLANT TREES.—The waste and neglected corners of the farm should be turned into timber plantations, where the farmer may grow his own posts, poles, fences, and firewood. It is worth while to keep all the farm at profitable use. The owner pays taxes on all his lands, and is out of pocket for whatever is not earning him something. Further, by growing a tree crop on land that is too poor to plough, the quality of the land itself is improved. Forests add humus to the soil, bettering its character; and there is no land so poor that some tree cannot be found to thrive there. Even if this timber has another use, it may break the force of the wind, and provide shelter for stock.—*Journal of Agriculture, Western Australia.*

Farm Transport.

THE RENARD ROAD TRAIN.

AN interesting article is published by *Dalgety's Review*, in its issue of June 1st, from the pen of Mr. C. O. Burge, M.Inst. C.E., on the subject of "Cheap Farm Transport in Country Districts," in the course of which the writer refers to the form of mechanical transport invented at the end of the last century by the late Colonel Charles Renard, of the French Military Engineers. This "road train," as it is called, has been adopted for use in war by the French, German, Spanish, and Austrian War Offices, while the British Government are making tests. But though the original invention had probably chiefly in mind assistance in military operations when the train was first exhibited in Paris in 1900, its suitability to the requirements of transport in times of peace was early recognised; its lightness, mobility and cheap working expenses which appealed to the approving military authorities just cited being just those qualities which made the system specially adapted to the conveyance of agricultural produce either to market direct or to the nearest railway, over bad or steep roads.

Mr. Burge gives a description of this "road train" which we think will prove of particular interest to our readers at the present time, and we accordingly reproduce the main features of his article. An idea of the appearance of the Renard train is conveyed in the illustration which we reproduce from *Dalgety's Review*.

In the Renard system there is no hauling as in the ordinary steam traction engine, with its trucks attached behind, but each vehicle comprising a train is mechanically propelled, although there is only one motor (the leading vehicle) to a train. This continued propulsion is effected by means of a universal or cordon flexible shaft running through the entire length of the train. From this shaft the power is transmitted to the centre pair of wheels of each vehicle by means of an ordinary differential shaft and side driving chains. To lessen all vibration and undue shocks there is a stiff spiral spring contained in the hub of each driving wheel which takes the strain off all the power. There are six wheels to each car, thus ensuring a comparatively light load on each, and consequently less damage to road surface or bridges than the ordinary four-wheeled wagon. The distribution of driving power in the manner explained above enables the motor leading the train to have a weight not exceeding 3½ tons on each driving axle with a 5-ton load, and consequently light driving wheels in place of the cumbersome ones that have to be used on ordinary steam traction engines on account of the heavy axle weight

and the amount of power transmitted through one pair of wheels. The difference in the damage done to the roads and bridges between these two types of vehicles is easy to see. Another advantage of this continued propulsion is that, should one or two vehicles of a train get into trouble in soft ground, the driving wheels of the remaining vehicles would be utilised to get the others out of the difficulty. As to steering, one of the peculiarities of the gear which effects this object is that each vehicle follow in the exact track of its predecessor, similar to that of a train on rails, both backwards and forwards, and any length of train can go round a corner curve of 15 feet radius. A Renard train usually consists of one 80-horse power motor and any number up to four followers, which may be for passengers, goods, or both. All trains are fitted with eight different speeds, which enable them to negotiate, fully loaded, any hill up to a gradient of 1 in 5½. Daimler engines are used. Each goods wagon has a useful carrying capacity of 5 tons, and each passenger carriage carries from 25 to 30 persons. The speed on a fairly hard and level road would be from 10 to 12 miles per hour. More vehicles up to six can be added, but this, as well as work over inferior roads or steep grades, will necessarily decrease the speed. The mention of the gradient which can be negotiated shows the possibility of successful transport by this system in localities where a railway could not be constructed with practicable gradients unless at a disproportionate expense. A steam locomotive on rails can barely take its own weight up a gradient of one-third the severity of the 1 in 5½ incline which has been given as the limit of the Renard motor with cars behind, while 1 in 40 is generally the limit of an ordinary railway train; and to obtain even this in a steep country would require deep cuttings, viaducts and tunnels, the cost of which would be unjustifiable except for the heavy traffic which, of course, is beyond the scope of the road train.

Naturally in France, the country of its origin, the system has had the greatest development so far, and the French Minister for Public Works has offered the local authorities annual subsidies out of the public funds for its adoption. As a result, the various departments of that country are one after the other granting annual subsidies for the establishment of services of trains—goods and passenger—on the Renard system, while in some districts separate companies are in operation. The first private goods train was started in 1905 by Messrs. Breteil Brothers, of Valognes (Manche), large dairymen, who have used it since daily to carry an average of 45 tons of butter by all sorts of roads and in all kinds of weather, the daily journey varying with the different markets, but averaging about 45 miles, and the firm have since put on a second train.

Another company has worked a passenger and goods train since April, 1906, between Remiremont and Plombières, in the Department des Vosges, and has increased its capital lately to obtain more rolling-stock:

while a second one has instituted a service of two trains (passenger and goods) between Boulogne, Ambleteuse and Wimereux, which has been a remarkable success.

A feature of the Renard road tractor is that, when not employed for transport by the farmer, it can be uncoupled and used for any other purpose where power may be required in agricultural operations.

An important matter in connection with this means of transport is its working cost; and particulars supplied by Messrs. de Roubaix, Oedenkoven & Co., of Antwerp, who have discarded the use of horses in their business in its favour, may be given. In this, of course, the difference in wages ruling in Belgium from those in Australia must be considered.

Daily expenses for a train composed of one motor and two followers:

	£	s.	d.
Petrol, 17½ gallons at 1s. per gallon	0	17	6
Driver, 4s. per day	0	4	0
Assistant, 2s. 10d.	0	2	10
Repairs, 2½ per cent. on capital of £1,856 (300 days to the year)	0	3	1
Depreciation, 20 per cent. on motor	0	15	4
Do. do. on two followers	0	9	4
Lubrication and sundries	0	2	0
Total	£2	14	1

Assuming 8½ tons carried 32 miles, the cost works out at 2·3d. per ton per mile. If there are three followers, the cost increases much less than the load, the result being about 1¾d. per mile per ton in that case. No doubt this cost, representing work in a city where the roads, though not very good, are necessarily better than those in the bush, is not a fair guide for work over rough roads and managed by better paid men, but there is a large margin between what is given above and the working expenses of animal transport in Australia. That the train is suitable to the rougher conditions of traffic outside the well-kept roads of Europe is shown by the fact that the Renard system has been in use successfully in California, in India, in Persia, in Chili, and in Australia—a train having been at work at the Union Consolidated Copper Mines in Victoria, where it works between the mines and the nearest available railway station over 76 miles of bush road.

In Bombay the train proved its superiority over other systems of road traction in handling heavy traffic in a short time, when, last Christmas, the mail from Great Britain was unusually heavy. The post office authorities put a Renard train into the service of transferring the mail matter from ship to train and to the General Post Office. This was

destined for the whole of India and weighed over 90 tons. The whole of this was transferred in seven journeys of 37 minutes for each double transit, the ordinary bullock carts previously employed only carrying each 1-27th of the load, each journey taking double the time. The result was that the outgoing mail trains were despatched with the least delay possible.

It is more, however, in view of the advantage to the transport of agricultural produce that the subject is here brought forward. The wise policy of the extension of light railways, especially in New South Wales, gives prominence to the necessity of feeding these feeders and establishing temporary branch lines of Renard trains, to be possibly later discarded for the light railway when the increase of traffic demands it. Both the first cost and the working expenses would necessarily be more than in the Antwerp example given; but still, assuming a small traffic, both would be greatly less than that of a light railway. It is not to be forgotten that the establishment of such a train equipment as that described is not an irrevocable step like the making of a railway. If the traffic does not justify it the vehicles can be shifted to some other place where they will be more useful.

Districts in New South Wales which immediately occur to anyone having a knowledge of the agricultural requirements of the country are numerous, a few of which might be suggested:—The Richmond district and an extension north from Kyogle, to which a railway is projected; feeders to the new North Coast railway from the rich districts lying between it and the great Northern Railway. Generally, the hilly nature of this part of the country excludes the possibility of cheap railway branches, and until the traffic develops so as to justify more costly ones, the cheaper substitute might reasonably be tried. Other localities are Muswellbrook to Cassilis, Galong to Burrowa, Grenfell to Forbes, Adelong to Tumberumba, Nowra southwards, Bega to Tathra, and Mount Victoria, or Rydal, where the grades are easier, to the Jenolan Caves. No doubt there are others, and many in the other States with which the writer is less familiar; and though before the adoption of this, as of any other new contrivance, it should be subjected to rigid investigation, and especially as to its suitability to Australian conditions, a sufficient case appears to be made out to institute such an enquiry.

Give the growing stock plenty of room, as crowded quarters retard the growth and injure the health of the chicks.

Farm Telephones for South Africa.

SOME INTERESTING CORRESPONDENCE.

WE are asked by the General Secretary of the South African National Union (P.O. Box 168, Capetown), to publish the following letters which have been received by the Union from the Governments of the Cape Colony, Rhodesia and Natal with regard to the establishment of farm telephones. This correspondence is the result of a resolution passed by the Union at their Kimberley Conference in May last to the effect that the Executive Council of the Union should approach the various Governments and endeavour to secure the establishment of a system of farm telephones. So far no replies have been received from the Transvaal and O.R.C.

The correspondence is as follows:—

I.

Treasury, Capetown,
3rd August, 1909.

To the General Secretary, S.A. National Union, Capetown.

Sir,—With reference to your letter of the 2nd ultimo forwarding copy of a resolution passed at the recent meeting of the Educational Committee of the S.A. National Union in regard to the establishment of a system of farm telephones, I am directed to inform you that the undoubted great benefits to be derived from an extension of the telephone service into the country districts so as to connect farmers and others with their social and business centres and with one another, have always been recognised by the Post Office and references to the subject have been made in the annual reports. There is no difficulty whatever in establishing farm telephone systems either for the use of a single homestead or to connect a number of farms on one line to the nearest village or railway station. The Department has already provided a number of lines for farmers, and it is always prepared to erect more to meet any set of practicable conditions that may be put before it.

The ordinary rental charges are £2 per annum for each telephone, and £4 per annum for each mile of line. These rates, which free the renter from the expense of maintenance, apply only in towns at which a linesman is stationed and where existing poles can be used. In outlying places this basis would not be satisfactory and in the case of lengthy lines the charge would prove prohibitive. The Department, therefore, undertakes to provide lines on the following terms:—

(1) The farmer may erect and maintain the line himself at his own expense, merely paying a nominal licence fee in formal acknowledgment

of the Government's monopoly. The Department, if desired, will furnish technical advice gratis and it will supervise the construction and carry out repairs on reimbursement of its expenses.

(2) The Department will erect the line at the farmer's expense and charge him the actual cost of subsequent maintenance, subject to the payment of the prescribed annual licence fee.

(3) The Department will erect the line at its own expense and rent it to the farmer under a 3, 5 or 10 years' agreement at an annual rate which covers all labour costs involved and interest and depreciation charges upon the cost of the line. At the end of the agreement period a substantial reduction is made, but throughout the whole time that the line is rented, the farmer is responsible for repairs, etc. These he may attend to himself, or the Department will undertake it at his expense.

(4) The Department will advise as to the best means of utilising fencing posts as supports for telephone purposes in any practicable case that may be submitted to it.

It will be seen that it is not sought to make any profit out of this class of service. Despite this, however, owing to the high cost of construction, the annual charges are considered by many applicants to be more than the telephone would be worth to them.

Telephones cost from £4 to £5 each and the present cost per mile of a single wire supported on 20 foot poles over open veld and soft ground within 20 miles of the railway may be taken as from £50 to £60. The line costs can, of course, be reduced if the farmer provides the unskilled labour needed, and a further saving can be effected if suitable wooden poles are procurable in the neighbourhood at a low figure.

It will, of course, be understood that the matter has been dealt with herein purely from a commercial point of view and that the Department has had to see that the revenue has been adequately protected against loss.—I have the honour to be, Sir, your obedient Servant,

(Sgd.) WM. A. COLLARD,
Assistant Treasurer.

II.

Department of Agriculture, Salisbury,
13th August, 1909.

To the General Secretary, S.A. National Union.

SIR,—In reply to your letter of 2nd July forwarding resolution passed at the S.A. National Union Congress on the question of farm telephones, I have the honour to inform you that I have laid the matter before the Postmaster-General, who states that his Department is pre-

pared to assist farmers in the direction of telephonic communication at the cheapest possible rate consistent with business principles. There are various ways in which telephonic facilities can be obtained at cheap rates, viz.:—

(1) The Department is prepared to build lines on guarantee, by the persons interested, of a revenue per annum which is based on the capital cost of the line. The amount of the guarantee depends upon the length of the line and whether built of wood or iron poles.

(2) Lines can be rented at tariff shown on the accompanying copy of Postal Notice (No 18 of 1908), or a modification thereof in those cases where the renter is willing to deal with public telegrams as well as his own business over the wire.

(3) Lines may be erected and maintained privately on payment of a small annual way-leave, not exceeding 10s. per mile.

(4) Arrangements can be made for the Department to supply the apparatus, wire, etc., and for the parties interested to build and maintain the line at a nominal rent.

He adds that he is most desirous of seeing the telephone utilised in every possible way, as there cannot be a doubt that facilities for communication with the town centres give a sense of security in outlying districts which is a valuable factor in their development, in addition to the better and quicker opportunities afforded for transacting business of all kinds.—
I am, yours faithfully,

(Sgd.) ERIC A. NOBBS,

Director of Agriculture.

III.

Department of Agriculture, Pietermaritzburg,
20th July, 1909.

To the General Secretary, S.A. National Union.

SIR,—With reference to your letter of the 2nd instant, on the subject of the establishment of a system of farm telephones, I have the honour to forward herewith, for the information of the Educational Committee of the S.A. National Union, a copy of a minute on the subject by the Postmaster-General of this Colony, together with the documents therein referred to. I also enclose a copy of a memorandum by the Postmaster-General regarding the cost of erecting telephone lines in Natal.—I have the honour to be, Sir, your obedient Servant,

(Sgd.) H. A. HIME,

Under Secretary for Agriculture.

MINUTE.

The connecting of farms by telephone with centres of population is a subject in which I am much interested and to which I have given time and attention, and I am prepared to undertake such works in any part of the Colony provided a sufficient return to cover annual charges and interest is assured. I beg to forward herewith for your information a resume of proposals made to provide such connections at Rosetta and Nottingham Road, but although I have no doubt the rates quoted were lower than would be quoted by any other South African Administration, the farmers concerned regarded the amount quoted as too high and the negotiations fell through. It is interesting to note that in the case of Rosetta the most distant connection is $6\frac{1}{2}$ miles from the station and the occupant would be required to pay only £10 10s. per annum for the service. At Nottingham Road the most distant connection is 11 miles away, and the farmer would pay £13 per annum. In Pietermaritzburg a business connection only a few yards distant from the Exchange is not installed for less than £10 the charge increasing by at least £1 for each quarter of a mile after the first two miles.

A person residing five miles from the Exchange and requiring a business connection with the Exchange would, therefore, be required to pay rent of at least £22 per annum, and the Natal telephone rates, I should point out, are the lowest in South Africa. In the Transvaal a good deal is being said about telephones for farmers, but there is very little difference between their new rates and ours, as they charge 10 per cent. on the cost of extension as a yearly rental, and their construction must be more costly than ours. I fear that unless farmers can be given telephones for next to nothing they will not take them up.

Rosetta.

It was proposed to connect 10 farms with each other and with the Railway Station. The erection of $16\frac{1}{2}$ miles of line was involved—of which 13 miles would have been an entirely new pole line. The work was estimated to cost £750, and it was proposed to charge a rental of £10 10s. per annum for each connection. The amount of £126 per annum includes a fee of £7 10s. payable to the Railway Department for clerks' services at the station in attending to the subscribers' requirements. (This fee would ordinarily be £2 10s. for such services, but owing to the required connections being widely separated it was necessary to estimate for the erection of three lines and arrange for connection to be established at the station as required.) The inclusive return per mile works out at £7 12s. 7d. The charge was regarded by the applicants as too high.

Nottingham Road

In this case it was proposed to connect seven farms with the station, the most distant being 11 miles away. The erection of a new pole line for the whole distance was involved and an expenditure of approximately £630.

Including a fee of £2 10s. for clerk's services at the station, an inclusive charge of £91 per annum was quoted or a return of £8 5s. 4d. per mile. The charge, amounting to £13 per connection, was regarded in this case also as too high.

Memorandum

The cheapest satisfactory line that could be erected costs £50 a mile, and to this has to be added cost of apparatus, say £52 a mile.

£52 at 10 per cent. equals a rental of £5 4s. a mile.

The Natal charge is £7 a mile on a new pole line, or 15 per cent. on cost, and for an extension where the pole already exists the charge is £4 a mile.

The Auditor-General is being consulted on the matter now to see if percentage could be safely reduced.

(Sgd.) C. MAXWELL HIBBERD,
Postmaster-General.

The colour of the brown egg grows lighter as the numbers of her product increases.

One of the best remedies for warts on animals is the use of equal parts of salacilic acid and lard. Apply to the wart once each day for a week or ten days, when the growth may be removed by soaking it in water.

Farmers should study how to raise farmers on the farm. Sometimes a farmer thinks that if he can raise a doctor or a lawyer he is doing well, but he should remember that some of the noblest and most successful men in the nation are farmers. The farmer may not become vastly wealthy, but wealth is not the measure of success.

East Coast Fever.

THE CAPE AND NATAL: STORY OF THE NEGOTIATIONS.

AN IMPORTANT TELEGRAM.

DURING the discussion on East Coast Fever which took place at the Annual Conference of the Inter-Colonial Agricultural Union, this month, some misunderstanding appeared to exist as to the stand taken up by Natal in the negotiations which followed the suggestion made by our Government that the other South African Colonies should assist, by financial contributions, in the stamping out of the disease in this Colony. An enquiry on the subject was made on the 10th inst. by the Hon. T. Carter, the Attorney-General for Natal, who is at present visiting Cape-town, and as the reply sent to Mr. Carter's telegram by Mr. Deane, Minister of Agriculture, makes the position very clear, we publish it herewith in order that the matter may be thoroughly understood.

Mr. Deane's telegram (despatched on the 11th September, is as follows) :—

Yours yesterday. On 11th March, 1908, the Cape, Orange River Colony, and Basutoland were asked by me to contribute towards our expenses in dealing with East Coast Fever, and were informed that Natal Government would be willing to give due consideration to any proposals which they might see fit to make as to plan of campaign. Cape Government inquired by telegraph on 16th March—(1) What amount different Colonies interested were likely to be asked to contribute; (2) the amount which Cape Colony particularly would be asked to contribute if proposal was accepted; (3) what control contributing Governments would have over the spending of their contributions. The Minister of Agriculture, Cape Colony, was informed in reply by telegraph, on 17th March, 1908, that the Natal Government hoped to be assisted to the extent of £50,000 by the Cape, Orange River Colony, and Basutoland, and that the Cape Colony would see its way to contribute £20,000. He was informed in the same message that we had already spent £187,000 in dealing with East Coast Fever, and that provision would probably be made in the Estimates for 1908-09 for an expenditure of an amount not less than we hoped to receive from the neighbouring Colonies. As regards the plan of campaign, it was suggested that the Principal Veterinary Surgeon of each contributing Government and myself should form a standing committee to decide as to the policy to be pursued from time to time, but that I would, of course, be glad at all times to receive suggestions from Ministers of Agriculture of the Colonies concerned. On 1st April, 1908, the Minister of Agriculture, Capetown, replied regretting that in view of the

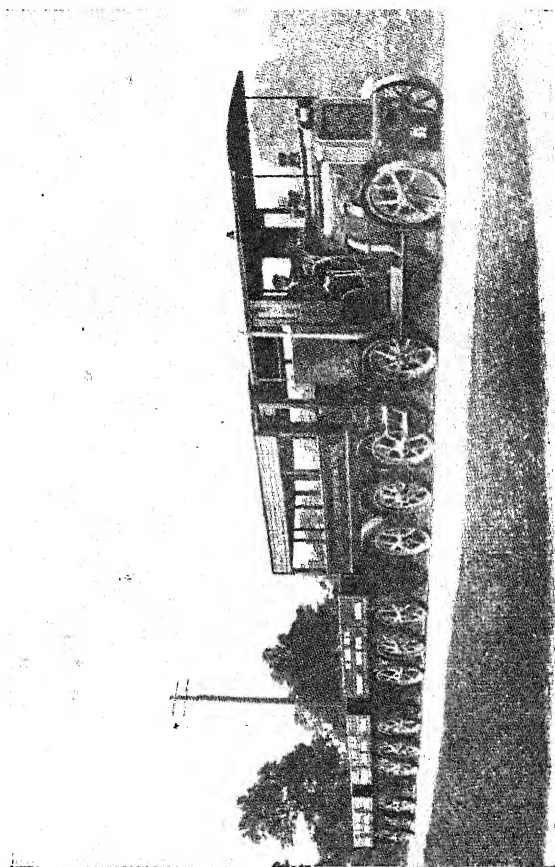
financial position of Cape Colony it was impossible to accede to my request, but that his Government would be prepared to fence the boundary of Alfred County along the Umzimkulu River from its junction with the Ibisi River to the sea, provided the Natal Government would give his Government facilities for guarding the fence and full control over guards and fence under regulations to be mutually agreed upon. A telegram was sent to the Minister of Agriculture, Capetown, on 21st April, thanking him for the offer contained in his telegram of the 1st idem, and stating that the Natal Government was not in a position to accept the same. On 1st May, 1908, I inquired of the Minister of Agriculture, Capetown, by telegraph, whether if proposals made in his telegram of 1st April were agreed to, the restrictions which had recently been imposed on trade between Natal and Cape territories would be removed, and the position which formerly existed would be reverted to. He replied on 4th May that in view of the proximity of the nearest outbreak in Alfred County, his Government could not see its way to relax the restrictions and revert to the former position in regard to Alfred County, although if a fence were erected and efforts were successful in keeping the disease out of Alfred County, he was prepared to reconsider this at a later date. In the same message he strongly urged upon me the advantages to be gained by Alfred County farmers by the erection of a fence, as it would protect their cattle from the great risk of infection, and pressed me to accept their offer to fence. On the 6th May, 1908, I asked the Cape Minister of Agriculture to send me full particulars as to the regulations in respect to guarding and control which his Government would propose if the suggested fence were agreed to, and also for information as to the lines upon which, in his opinion, adequate means for the exclusion of East Coast Fever from Alfred County would be secured by the erection of the fence proposed. On 5th June, 1908, he replied regretting his Government's inability to accept the conditions suggested verbally to him by the Natal Treasurer at Capetown; that his Government should fence the Umzimkulu River where it forms the north-eastern boundary of Alfred County, subject to free intercourse as regards the movement of stock being permitted between Alfred County and the native territories, and stating that the proposal to fence the Alfred County section of Umzimkulu had been abandoned. This correspondence eventually led to arrangements being concluded with the Cape Government for the guarding of the Umzimkulu River at their expense, they having decided, as the result of personal inspection by their Chief Veterinary Surgeon, to withdraw their offer to fence the river owing to the topographical features of the country to be fenced and practical difficulties, and the river had been guarded at their cost from 1st October, 1908, up to the present time.

On 16th March, 1909, Mr. Merriman sent a confidential wire to Mr.

Moor with reference to an outbreak of tick fever at Ixopo, saying that he was glad to hear from Ixopo that the Natal Government was taking steps to isolate outbreaks of fever there and that his Government was endeavouring to get co-operative action with the Orange River Colony and Basutoland, and that the Chief Veterinary Surgeon of the Cape Colony was leaving that night to try and arrange some course of action. On 1st April, 1909, he wired again to Mr. Moor asking him to take the tick fever in Ixopo business into serious consideration, 'as it was a vital matter, and stated that he had asked Gen. Botha to lend one of his experienced officers to advise on the spot with the Chief Veterinary Surgeon of the Cape Colony. On 1st April Mr. Moor replied that we should be glad to have advice of the Transvaal officer as regards the outbreak of tick fever in Ixopo district, and on the following day he telegraphed further saying that we had already spent approximately £300,000 in our endeavours to suppress East Coast Fever in this Colony, and that this should unquestionably be taken into consideration by our neighbours in connection with any scheme for preventing further spread of disease in Natal, and its possible extension over the borders of the adjoining territories. Mr. Moor added that we were willing to co-operate so far as our means would permit, but would like to know what amount other Colonies, including Basutoland, were prepared to contribute. He stated further that if matters could be satisfactorily arranged financially we should be pleased to take part in any discussion with a view to an agreement being come to as to some general policy of concerted action. On 3rd April, 1909, Mr. Merriman replied that General Botha had kindly lent Gray, Principal Veterinary Surgeon of the Transvaal, and requesting that arrangements might be made for the Principal Veterinary Surgeon, Natal, to accompany the Cape and Transvaal veterinary surgeons to Ixopo. He added that he was by no means satisfied at the idea of giving experts too free a hand, and that they would require most careful watching. He stated further that after the full report of the veterinary surgeons was received the allocation of expenditure and arrangements for joint action could be discussed. The Transvaal and Cape veterinary surgeons visited Natal in due course, and on 15th April they submitted their joint report, of which I have a copy, to the Prime Minister, Cape, from whom not a single word on the subject has been heard from that day to this. On 1st May, 1909, the Minister of Agriculture at Pretoria sent me a copy of the joint report before referred to with a copy of a Minute on the subject by his Director of Agriculture, and stated that he understood it had been suggested that the various South African Governments should contribute a sum of money for the eradication of East Coast Fever in Natal, but that he regretted that his Government was not prepared to vote funds for this purpose whilst the disease was prevalent in the Transvaal.

In July, 1909, the Cape authorities were approached with reference to their undertaking the fencing of the Stuartstown railway line, and on 19th July, 1909, the Minister of Agriculture, Cape, telegraphed suggesting that the line from Esperanza to Donnybrook should be fenced and guarded. The following day I replied enquiring to what extent his Government would be prepared to contribute to the cost. On 21st July he replied that his Government would pay 25 per cent. of the cost of a suitable fence and adequate guarding, provided the Natal Government undertook to keep the disease north of line by stamping out any outbreaks which might occur to the south of it. On the 26th July I replied that the undertaking asked for could not be given and that his offer of the 21st July would not, therefore, be accepted. On 30th July the Cape Minister of Agriculture enquired by telegraph why the undertaking asked for in his telegram of the 21st could not be given, and he was informed in reply on the 13th August that the reason was that this Government had recently decided that no movement of cattle from infected farms over clean veld could be allowed, and that stamping-out of outbreaks which might occur south of the railway from Esperanza to Donnybrook would probably, therefore, necessitate slaughter of cattle on farms. I added that cattle so slaughtered would have to be paid for by the Government, and as meat could not be either moved or sold on the spot, this Colony would be involved in an expenditure which it was quite unable to afford. On the 14th August, he replied that, in view of what was stated in my telegram of the previous day, his Government was prepared to pay 50 per cent. of the cost of fencing and guarding the south side of the railway line from Esperanza to Donnybrook, and also a similar proportion of the cost of fencing and guarding individual outbreaks south of such fence. On the 19th August I asked him whether, in view of the serious outbreak of East Coast Fever which had occurred in Alfred County since his offer of the 14th August was made he wished to withdraw that offer, to which inquiry he replied on 20th August stating that he wished his offer to stand, notwithstanding the outbreak in Alfred County, and on 2nd September he was informed that Ministers found themselves unable to accept the offer as the Colony had so many calls upon it at the present time that it could not afford the expenditure which would be involved.

As the weather begins to get hotter be sure to give the pigs plenty of pure, fresh water. They are especially fond of a good drink just before retiring.



Reproduced from]

THE RENARD ROAD TRAIN.
(See Article.)

[Dalgety's Review.

"Traffics and Discoveries."

NOTES AND INTERVIEWS BY OUR TRAVELLING COMMISSIONER.

VI.—WHERE FERTILISERS ARE MANUFACTURED.

LAST year South Africa sent oversea, through Durban alone, £25,618 for the purchase of artificial fertilisers. Natal herself purchased £23,280 worth, and, assuming that there are some 4,000 farmers in the Colony, this means that on an average each farmer spent just under £6. for imported commercial fertilisers last year. These facts, if they do nothing else, serve to show the extent of the market that still exists for artificial fertilisers over and above the annual consumption of South African made fertilisers. To make the position as regards fertilisers still clearer, I may remark that Natal-made manures to the value of £3,779 were exported last year to other parts of South Africa.

So much for a few introductory reflections. They mean this, that some £25,000 is being sent away from Natal annually for the purchase of artificial fertilisers; and when one is confronted by such a statement one naturally wonders whether something could not be done to reduce to some extent this annual expenditure on goods produced in oversea countries—to reduce it, not by any means by endeavouring to curtail the use of fertilisers on our farms, but by the extension of the local fertiliser manufacturing industry; and such extension can be assisted perhaps very materially by pointing out to the farmers of this country what is actually being done in the way of manufacturing fertilisers within our borders. For one thing is very certain, and that is that the majority of our farmers have no conception of the magnitude—for such a small Colony as ours—to which the fertiliser manufacturing industry has attained. They know that such an industry does exist in Natal, but as to what is the largest factory, or how many factories there may be, and what those several factories are turning out and the extent of their operations, most of our farmers have notions that are hopelessly, but certainly excusably, vague.

THE S.A.F. CO.'S FACTORY.

With these thoughts in mind, I asked the manager of the South African Fertilisers Co., Mr. A. M. Neilson, during the present month whether he would be good enough to permit me to "interview" him for the benefit of readers of the *Journal*, and show me around his company's works at Umbilo, and upon his acceding to my request I accordingly betook myself to Umbilo one afternoon during the spell in the proceedings of the Agricultural Conference at Durban.

At the outset let me say, for the benefit of those who do not happen to know, that the South African Fertilisers Company is the largest organisation of its kind, not only in Natal but in South Africa, and that their factory is the only one of appreciable size in this Colony of its kind. The company started its operations some five years ago, and its output has steadily increased year by year until it now turns out large quantities of fertilisers annually (besides other products, which I shall refer to in their proper place), for consumption in the Colony, and does a good export trade with the other Colonies, including the supplying of quantities of fertilisers to the Cape Government Experiment Farms. Indeed, when I saw the exterior of the company's buildings at Umbilo I knew I had come upon a commercial undertaking of no small dimensions, but I had no idea of what I should actually see in the interior, and I came away much more greatly impressed by all I had seen and heard than I thought I would have been.

But let us begin at the beginning—and the beginning, after my introduction to Mr. Neilson and a little conversation with him in his office, was a visit to the laboratory, where all the testing, experimenting with new fertilising compounds, analyses, etc., are carried out. The laboratory is well fitted and contains a good stock of all the various chemicals likely to be required at any time.

MAKING SULPHURIC ACID.

Our tour of inspection proper began with a visit to the sulphuric acid plant. As most farmers know, sulphuric acid is used largely for treating mineral phosphates and bones—in other words, for converting the water-insoluble phosphates which these materials contain into a soluble form so that they can be made use of by plants. If these mineral phosphates and bones are not so treated they must be ground very fine before they can be used in the least degree by plants, and even in that form they must remain for a considerable time in the soil before the phosphates which they contain can become available. This brief explanation will serve to show the important part which the sulphuric acid apparatus occupies in every properly equipped fertiliser factory. The plant which the S.A.F. Co. have constructed for the purpose of making sulphuric acid is a large one, and is perhaps one of the most interesting sections of the works. A furnace on the ground floor of the structure converts the raw sulphur from which the acid is manufactured into gas, which is then conveyed by means of a flue to one of two large lead tanks above. These tanks are large constructions, each measuring 80 feet in length. The leaden walls are an eighth of an inch in thickness, and are sunk into a "basin" of water in order to render the chambers gas-tight. The gas from the furnace below travels the length of each of these chambers, first through one and then through the other, and in doing so the moisture

is precipitated as acid. In connection with each tank there is an hydrometer and a thermometer, the former to enable the strength of the acid within the tank to be ascertained, and the latter, of course, to indicate the temperature of the contents of the tank—and in this connection I may mention that the upper storey of the structure, bearing the two tanks, is constructed so as to give a maximum circulation of cool air, separated laths being used instead of solid walls: this is provided in order to keep the contents of the tanks as cool as possible.

When the sulphuric acid leaves these tanks it is 60 per cent. pure, which is the strength required for making fertilisers. The company has, however, another plant, for still further concentrating the acid for other commercial purposes, but as this plant is of no interest to agriculturists I need not attempt a description of it here.

SUPERPHOSPHATE AND DISSOLVED BONE.

Our next move was in the direction of the fertiliser factory, properly speaking. Here Mr. Neilson first showed me the mixing apparatus where the ground bone, or phosphates (as the case may be), are compounded with the sulphuric acid for the manufacture of dissolved bone compound in the one case and superphosphate in the other.

The apparatus is a simple one, consisting primarily of a tank, sufficiently large to mix one ton of material at a time, sunk to the level of the floor. A lever operates a trap door at the bottom of the tank or bin. The proper quantities of bone or raw phosphate and sulphuric acid are placed in the bin, and at the completion of the mixing process (a matter of five minutes) the trap door is opened and the mixture falls into a den, where it remains for two or three days to solidify. From 60 to 80 tons a day are thus turned out. The mixture is then brought back to the upper floor by means of an elevator, and left for a week to dry.

I might mention that this mixing apparatus is used not only for the manufacture of superphosphate and dissolved bone compound, but is also utilised for the compounding of special manures, such as the well-known Safco mealie fertiliser, potato fertiliser, etc.

The next process is that of grinding. This is done by means of a treble wheel—in other words, three wheels on one axle, the middle one of which is driven in a contrary direction to that of the other two. Each of the three wheels is in reality a double one, the two parts being held together by means of studs or bars passing from the circumference of one to that of the other. When these three sets of wheels are rotated they very effectually crush the dry masses of treated bone or phosphate fed on to them.

As the bone or phosphate is broken up it falls on a shaking screen. The screened portion passes down a chute, whilst the larger lumps are returned to the machine to go through the crushing process once more.

The screened material is delivered on to the bagging floor, where, after being packed in the sacks, it is transferred to the railway trucks (the company has a private siding) or stored for future requirements.

I should mention that, before the bone (in the manufacture of dissolved bone compound) is put into the mixer, it is burned in order to get rid of the organic matter it contains, and is then passed through a disintegrator, when it is ready for treatment with the sulphuric acid.

THE ENGINE ROOM.

The engine room and workshops next claimed our attention. The engine is a compound one, of 150 h.-p., and is used to drive the disintegrating machinery that forms an important feature of the factory, as well as the mixing machinery and elevators.

In the engine-room Mr. Neilson showed me a very useful fuel-saving device in the form of a mechanical water-heating apparatus. Instead of running the water into the boilers cold, it is heated first to a considerable degree by means of the exhaust steam from the engine. This struck me as a very ingenious device—though perhaps not a new idea—and Mr. Neilson informed me that it reduced their coal bill very considerably.

All the general engineering work, blacksmithing, etc., in connection with the factory is done on the spot by the company's own employees.

BONE DUST

Mr. Neilson then led the way to the bone-grinding section of the factory. Outside the works I had noticed huge piles of bones of all sizes and description—collected, as Mr. Neilson told me, from all over the Colony, as well as from the Transvaal and O.R.C.. These bones are, of course, utilised in the manufacture of bone dust and dissolved bone compound, and the machinery used for dealing with them, I found, was of the most up-to-date description. The bones are first broken up into small pieces, and are then conveyed by means of an elevator to the degreasing apparatus, which removes all the fat in them, after which they are crushed fine and sifted.

Mr. Neilson explained that ordinarily bones are crushed in their raw state, i.e., without any previous chemical treatment for the purpose of eliminating the fat and fibrous matter which they contain. Now, this fat acts as a preservative, so that bone-dust from which the fat has not been eliminated takes a considerable time to dissolve in the soil. By first removing the fat from the bones, the S.A.F. Co. turn out a bone-dust that, upon application to the soil, very soon dissolves, releasing the phosphates it contains to be taken advantage of by the plants.

This removal of the fat in the bones serves three good purposes: in the first place, it gives the bone-dust a higher manurial value; in the second place it yields a by-product which is of some value to soap-manufacturers, and Mr. Neilson told me that his company is able to

sell all the fat they are able to turn out; and finally the bones are effectually sterilised.

The degreasing machine, for the extraction of the fat, is an interesting one. The broken bone is literally boiled in benzine kept at a temperature above boiling point, and this process serves, as I have just said, to sterilise the bones. Mr. Neilson told me that he had approached eminent bacteriologists in London, Germany and America for their opinion as to the effectiveness of this sterilising process, and they were all of opinion that no bacteria could live in benzine above the boiling point of water; even anthrax germs would be destroyed. The boiling process has to be gone through three or four times before sufficient fat is extracted.

After having been degreased, the bone is disintegrated and sifted, and is then ready for the market.

The output of the factory is 20 tons a day.

Passing through the warehouses, Mr. Neilson showed me a few bags of nitrate of lime and calcium cyanamide, which he had recently imported from Norway and Germany respectively. As perhaps some of my readers are aware, the extraction of nitrogen from the atmosphere and its conversion into a form suitable for the requirements of crops, has now been placed upon a commercial basis, and factories are running in Norway and Germany turning out tons of this new fertilising material. Mr. Neilson explained that the nitrate of lime resembles nitrate of soda in its action, whilst the calcium cyanamide is more like sulphate of ammonia.

Proceeding, we came to a printing machine which the company uses for marking sacks. The principle of this machine is that of the common clothes mangle, the upper roller bearing the type (which are made of a rubber composition) and receiving the ink from a smaller roller running in contact with it. Two Indians were working the machine when I saw it, and they were running the sacks through in fine style.

The warehouses were filled with hundreds of bags of bone-dust ready for despatch, as well as large quantities of other manures, such as nitrate of soda, sulphate of ammonia, basic slag, and the company's own fertilisers, such as Safco, Potato Fertiliser, Dissolved Bone Compound, etc.

NATAL PHOSPHATES

My mind had naturally during our round of inspection been running on the possibilities of our Natal mineral phosphates, and when we had got to the end I thought I would ask Mr. Neilson's opinion of them.

"Do you use any quantity of Natal mineral phosphates in your factory in the manufacture of superphosphate, Mr. Neilson?" I began.

"We use none at all," was the reply. "They are of little or no value for the purpose."

On my expressing my natural surprise that this should be so, Mr.

Neilson said that the Natal phosphates were, on the whole, of inferior quality as compared with the American product.

"You import, then, all the raw phosphates you require, from overseas?" I remarked.

"Yes, we supplement the local supply of bone phosphates with importations of guano phosphates from islands adjacent to the South African Coast."

"Does it not seem a pity that local phosphates are not utilised for making superphosphates?"

"It does, but the fault is in the phosphates, and it must be remembered that the local fertiliser industry has no protection whatever, and it would not be a benefit in the long run either to the Colony or to ourselves to make fertilisers with local phosphates since they would be inferior to imported goods made from high grade phosphates, which are carried from Europe at the same rate of freight as we are charged on South African manures from Durban to East London."

Mr. Neilson then went on to speak of the controversy which took place in the daily press some time back between himself and the discoverers of the Weenen phosphates, as to the manurial value of raw phosphates. "Of course," he said, "I am told that I am interested in the sale of superphosphate, and that I am averse for that reason, to the use of raw phosphates for manurial purposes. They quite overlook the fact, however, that if I considered that mineral phosphates were of sufficient value to warrant their use, untreated, as a fertiliser, I could import and sell in the Colony as much raw phosphate as I liked—as a matter of fact, I have imported quantities for use in our works, as I have just told you. Then again, if the Natal phosphates were of sufficient value, it would be quite open to me to buy them for use here in our factory instead of importing, and I would certainly prefer to do that."

"What is really the fault with the Natal phosphates?" I asked.

"They contain too much iron and alumina. Apart from the question of their inferiority to oversea phosphates, however," Mr. Neilson went on, "most scientists consider that mineral phosphates are valueless in the raw state as fertilisers. Even Dr. Jamieson, who is not altogether disinclined to look upon them with favour for use with some crops, gives it as his opinion that they are utterly worthless for grain crops, and are only useful for root crops such as turnips. This is a fact that should be recognised by those who are expecting great things from our Natal phosphate deposits."

In the course of further conversation I learned that the S.A.F. Co. are establishing a branch factory on the Bluff for the manufacture of fish guano and other manures, from whales' flesh obtained from the whaling station. Fish guano consists of bone and flesh mixed together, and contains 30 per cent. of phosphate of lime and 5 per cent. of nitrogen.

It will therefore probably prove a valuable manure for mealies. It is also proposed to make a fertiliser from whale flesh alone, dried and ground. This, of course, would not be as rich in phosphoric acid as the fish guano, but would be a good nitrogenous manure.

VII.—MR. C. E. MOORE'S PLOUGHING DEMONSTRATION.

THE demonstration, in which the "Champion" mealie planter, the "Martin" cultivator, the "Canadian Chief" plough, the South African Disc Plough, the famous Blue Bird, Western Queen, "Flying Dutchman," the "Corn King" cultivator, and the "Capt. Kid" cultivator were employed, was given at Cedara on the 27th and 28th August. About 100 of the more enthusiastic agriculturists of Natal witnessed the operations, a number of whom were continually asking questions. Mr. Moore proved to be only too willing to furnish all the possible information. The greatest interest centred in the mealie-planting demonstration, and the working of the implements was thoroughly explained by the expert.

It was not until the lunch hour that I was afforded a suitable opportunity of interviewing Mr. Moore, with a view to learning the methods of the mealie cultivation which are followed in the United States—the greatest maize-producing country of the world—for the benefit of the readers of the *Journal*.

"Well, Mr. Moore, what do you think of Natal's possibilities as a mealie-growing country?" was the first question I asked.

"From what I have seen of your country, I consider that you have very brilliant prospects in the direction of corn," was the reply to this question, and, as was only natural, I was at once anxious, and decided to gather whatever reliable information I could from him.

"As compared with the soil of the United States, what do you think of ours?"

"I certainly see no reason why your farmers should not secure equally as good results as we do—that is, of course, provided they adopt the correct methods of cultivation. I reckon you will be somewhat surprised when I tell you that in five of our States alone we produce some 1,450,000,000 bushels (435,000,000 muids) of corn annually, the largest one of which is Illinois, which turns out about 350 million bushels (105,000,000 muids) every year."

"Yes, I must admit that our farmers would not object to having a similar output; indeed, I think they would be perfectly satisfied with a return equal to that of even the one State—namely, Illinois. However, I have no doubt that within a few years we shall also be able to boast of our mealies. I refer, of course, to the quantity, not the quality, because I feel sure that we can hold our own against any of the world in so far as the 'quality' is concerned. What do you consider a good

yield per acre of mealies in your country? We consider ourselves very fortunate if we get fifteen or twenty muids to the acre."

"Well, I guess and calculate that if we, in the States, were not able to produce more than that, we should not be long in putting in some other crop to take the place of corn; why, our average yield per acre for the whole of the States is about 60 bushels (18 muids), and in some parts of Illinois, Iowa, and Kansas we get as much as 110 bushels (33 muids) to the acre."

"A few minutes ago you said that, taken on the whole, Natal soil is equal to that of the United States for the cultivation of mealies. That being the case, how do you, then, account for our average yield per acre for the Colony being just over five muids, whilst yours is, as you have just said, 60 bushels, which is equivalent to 18 muids?"

"The whole secret of the success in the production of corn lies in the preparation and cultivation of the land and the crop. I have observed very carefully the operations of the system of corn-growing since I have been in South Africa, and I cannot help but remarking that there are very few of your farmers who do *farm* in the real term of the word. You have the land, and I can assure you that you have quite a number of excellent spots for the growing of corn; but, as I have already said, you do not *farm*. If a number of acres are to be put under corn, the land should first be ploughed, and ploughed properly, and when the crop is coming up it is essential that the land should be kept absolutely free of weeds and trash. Most of the failure of the crop in Natal is, I reckon, due to insufficient attention to the ground after planting. Another thing which I have observed about the planting of corn in Natal is that of sowing the grain broadcast. This should never be done. Do you know that the only time when we sow our corn in this manner is when the crop is to be utilised for nothing but feeding to stock while green. The grain is sown very thick in this case, and as soon as the plants are about three feet in height they are cut down and fed to the stock. After having been planted with corn in this manner for one season the ground is, of course, considerably enriched, the greater part of the weeds having been choked by the corn."

"What are the principal fertilisers which you employ in the production of maize in the United States?"

"Very few artificial fertilisers are employed in our country for the production of corn. We have quite a large supply of farmyard manure, most of which is employed for corn. But, as I have already said, the secret of success in the corn crop lies almost entirely in the preparation of the soil. It is, of course, necessary that the land should be given a certain application of manure, but I reckon that, unless the land is properly prepared and the crop kept free from weeds, it is impossible to obtain good results. My advice to your farmers is to pre-

pare the land, keep the crop clear of weeds, and go on preparing the land and keeping the crop clear of weeds."

"Is it true that you consume practically the whole of your mealies in your own country?"

"Yes, it certainly is. We consume the whole of our corn, and, I might add, were our annual production twice as large we should consume it all. A certain gentleman, when I told him what I have just told you, asked, 'What on earth do you do with them; how can you consume them all?' To this I replied, 'We feed our stock.' Do you know there is absolutely nothing better for fattening purposes than corn; more especially is this the case with hogs. I reckon that you will be a little surprised when I tell you that, during the whole of the twenty-four hours of the day, the rations of the hog contains a certain percentage of corn."

After having had Mr. Moore's views on the possibilities of Natal as a maize-growing country, I ventured to ask his opinion on those of South Africa, and he proceeded to relate a conversation which had taken place between himself and a Transvaal gentleman. He went on to say, "A man said to me that the gold output of the Transvaal was 30 million pounds' worth a year. In return I told him that the United States had an output every year of agricultural produce valued at 850 million dollars (£170,000,000). The gold won't last; agriculture will remain, and the two of them will make a great country of South Africa."

In feeding any farm animal, from the pig to the colt, try and follow as nearly as possible the natural way that the young animal is fed. It will surprise the reader when he does this to find that previously he has been feeding about three or four times as much as he should.

Hiccoughing in pigs is caused by a derangement of the stomach. One of the best ways to correct the trouble is to change the sow's ration, feeding less maize and more of such feed as ground oats and bran. If the trouble does not cease, give each pig eight drops of tincture of asafoetida twice each day till the hiccoughing ceases.

Division of Agriculture and Forestry.

REPORT FOR JULY AND AUGUST.

OWING to pressure of work and disorganisation caused by the recent fire at Cedara, the report of this Division for July was unavoidably postponed, and is included with that for August submitted herewith.

SCHOOL OF AGRICULTURE.

The outstanding feature of the period under review has been the first Vacation Course in Agriculture to Head and Assistant Masters from the Government Schools. The course extended from July 5th to the 30th, and the following weekly time tables reflect the ground covered during that time:—

- July 5th, 7.30 p.m.—Introductory Address.
- July 6th, 9 a.m.—Agricultural Chemistry.
- 10 a.m.—Bookkeeping.
- 11 a.m.—Principles of Agriculture.
- 2 p.m.—Farm Mechanics.
- 3 p.m.—Principles of Live Stock Husbandry.
- July 7th, 9 a.m.—Apiculture.
- 10 a.m.—Apiculture Demonstration.
- 11 a.m.—Farm Mechanics, Demonstration.
- July 8th, 9 a.m.—Agricultural Chemistry.
- 10 a.m.—Agricultural Botany.
- 11 a.m.—Mensuration.
- 2 to 4 p.m.—Demonstration in Ploughing.
- July 9th, 9 to 12 noon.—Group 1. Demonstration in Butter Making.
- Group 2. Tools used in Farm Carpentry.
- 1.30 p.m.—Principles of Agriculture.
- 2.30 p.m.—Principles of Live-stock Husbandry.
- July 12th, 9—12 a.m.—Group 1. Dairy Practice.
- Group 2. Farm Engineering.
- Group 3. Horticulture.
- 2—4 p.m.—Apiculture.
- July 13th, 9 a.m.—Agricultural Chemistry.
- 10 a.m.—Afforestation.
- 11 a.m.—Principles of Agriculture.
- 2—3 p.m.—Farm Mechanics.
- 3—4 p.m.—Principles of Live Stock Husbandry.

- On Friday and Saturday, the 27th and 28th, Mr. Moore, on behalf of Messrs. Malcolmess & Co., gave a series of demonstrations on the use-

of various farm implements for the benefit of the students and a large number of farmers and others interested in agriculture who had accepted a general invitation.

THE ANALYTICAL LABORATORY.

During the month only a few fresh samples were received, a great part of the time being devoted to an investigation of a number of soils from different parts of Natal.

Five samples of phosphatic rocks were examined, but all of them proved disappointing.

A consignment of Natal-grown sweet potatoes showed a somewhat low proportion of starch, containing only 15 per cent.

An excellent specimen of limestone was received from Newcastle. It was of good colour and gave the following results on analysis:—

				per cent.
Moisture	...	...	...	0.3
Silica and insoluble matter	...	...	...	4.3
Iron and aluminium oxides	...	...	...	0.5
*Oxide of lime	...	...	...	50.8
Carbon dioxide	...	...	...	41.3
Magnesia and Alkalis	...	...	...	2.8

* Corresponding to carbonate of lime 90.7 per cent.

This limestone would be of undoubted value both as it is and in the burnt state. It is exceedingly gratifying to come across a good specimen of this material after so many disappointments. It is to be hoped that there is a large deposit of this limestone at Newcastle. The soils of Natal are very poor in lime, and the discovery of a large bed of limestone from which a cheap and steady supply of lime could be obtained would be a great boon to farmers. Another direction in which limestone is valuable is in the production of iron from its ores. There are large deposits of rich iron ore scattered over Natal, and if a cheap supply of limestone were forthcoming it would be possible to work these on a commercial scale.

Two samples of soil from the Mt. Edgecombe district contained the following quantities of potash and phosphoric acid soluble in 1 per cent. solution of citric acid:—

		No. 1. per cent.	No. 2. per cent.
Potash	...	0.028	0.016
Phosphorus pentoxide	...	0.004	0.004

The solubility of these substances in citric acid is a measure of the degree to which they are available for plant food, the dilute solution of citric acid having practically the same action as the acids secreted by the root-hairs of plants.

APPOINTMENT OF BIOLOGIST.

Mr. J. Duncan Davidson, late Biologist to the Division, left on June 30th to take up an appointment at the School of Agriculture recently opened at Potchefstroom.

Mr. John Fisher, B.Sc., has been appointed to fill the vacancy and took up his duties on August 23rd. While the post was vacant, Mr. Legward, the Consulting Engineer of the Howick Falls Power Company, kindly consented to deliver a series of lectures on "Water Power as applied to Agriculture."

FOREST CONSERVATION.

The Chief Forest Officer, Mr. G. H. Davies, reports for July as follows:—

At 'Ngomi a small cutting section has been opened to meet any demand that may arise, but, as already reported to you, the accessible parts of this forest have been so cut out and maltreated in the past that few trees are available for marking. Years of careful conservation will be required to restore the bush; and sowing, as well as removing the excessive canopy of the old-barks left by the uncontrolled sawyers, will be necessary over much of the forest. I recommend Forester Foster to heel in bush seed wherever it is likely to come up, but especially in the cutting section, which he should regard as an example of what he can do in conservation. He notes in his report the ruin that has overtaken the private bushes in his neighbourhood: the large clearings for saw-pits, and the removal of everything in them except the rotten old-barks that do not pay to touch—just the trees that should be killed before sound timber is selected. One private bush near him has much decreased in size since his arrival last year owing to burnings for Native cultivation, which now covers places where bush stood twelve months ago. For twenty years at least, to my knowledge, it has been pointed out by responsible persons that the rare indigenous forests of Natal should be under public supervision whether privately-owned or not. The rights of property in this connection override those of the commonweal and require to be limited by a Forest Law; but the individual has generally proved to be stronger than the community in as small a population as ours.

Forester Foster mentions in his report the superabundance of lemon-wood in certain areas of the 'Ngomi: a condition which obtains in many forests—notably the Ingeli. In view of recent official enquiry about sleepers for railways, there seems to be some prospect of using this timber. It has been proved capable of standing exposure, but as it is not in much request by sawyers its abundance has embarrassed Foresters trying to clear sections of excessive canopy—to which it contributes more heavily than most species. Should the enquiry result in a demand for this tree it could be marked in large sections to be specially cut over for

it, to the advantage of the forests. Of no other tree could this be proposed.

Forester Mason, of Hlatikulu, Mooi River, passed, on patrol, from one Crown Forest to another, through a portion of the Native Trust bush, where Natives were cutting; and noted the absolute ruin of the forest, in which the stumps of many fine trees testified the former stand of timber. He points out that the location land is first-rate wattle country, and thinks that it is a great pity that wattle-growing was not done there to supply the Natives with hut material and firewood. The Native prejudice against acacias as wattles cannot hold out against their obvious advantages in straightness and in ease of collection, and now that the wild bushes are nearly destroyed on locations they are buying wattles from Europeans. If wattles had been grown on locations years ago their natural forests would to-day be much larger, and perhaps it might be a good way to spend the money voted for Native amelioration—better even than on schools, as example is better than precept.

Mr. Leigh has now assumed the Forestryship of the Entumeni, in Zululand, in place of Mr. Vanderwagen, who leaves the neighbourhood. [The latter in his final report gives 169 bundles of wattles cut under free permit during the month. This being an example of what is going on in all the forest "Reserves" of Zululand—though Natives have free run of the bushes on their own reserves—conservation can hardly be expected to pay.

Springtime is showing early in bushes this year. Trees named as in flower in July reports are: Black Stinkwood, Waterboom, Saffraanhout, Minza, Cape Beech, Vlier, and Dogwood. Black Stinkwood is also in seed at Ingeli, and there and in other districts seed is reported on several species: Klip Ess, Blackwood, Wild Chestnut, Knobthorn, Bush Willow, Assegai, and Dog Plum. Forester Chilvers states that he has sent you many kinds of seeds, but Forester Cruickshank found Flatcrown seed to be all grub-infested.

Forester Gryspeerd—who was down with fever in June—has been patrolling the main rubber-fields at Maputa. He reports them quite untouched and the vines looking well, but says that wildebeeste are fast spreading the tsetse fly and expects the sleeping-sickness to follow. At Giant's Castle, Forester Symons reports that twelve Natives have been posted about the Reserve and that all is in readiness to catch eland calves; in fact some success has been attained already. No buck-hunting has been done in the Ingeli and none successfully at Ingwangwane, but Forester Cruickshank reports a great deal of hunting by Natives in Alexandra County: many of them own land with patches of bush, which they quite clear of game—trusting to re-stocking from Europeans' preserves. A full report has been sent you of the big poaching case at Ngomi, which produced fines to over £90 for about fifteen piti and a

hare killed before the hunt could be stopped. Bush partridge is plentiful about Bulwer and Donnybrook, but at the Emkazení grass-fires seem to have driven away birds. Protective burning round forests were completed at Ingwangwane, Qudeni and 'Ngomi; at other stations this is still proceeding.

The Native squatters at 'Ngomi will not pay their arrears of rent until they are forced. They do not attempt to earn money.

Forester Tarboton, of Empangeni, has been patrolling bushes to Kwambenambi. He found the Native's cattle there free from East Coast Fever. Gales have damaged the plantation trees at Empangeni. He praises the work of the steam plough at Messrs. Norris' in breaking up land.

The weather is generally reported as mild. Snow, of course, covered the Berg, and reached down to the lodge at Giant's Castle, where the cold was severe on 6th, 7th and 8th July. The same days were bitterly cold also at 'Ngomi, and probably at all exposed stations. Forester Foster is now supplied with a rain gauge and thermometer.

[Owing to extreme pressure on our space this month, Mr. Davies' report for August is held over for next issue.—ED.]

AFFORESTATION.

The Chief Afforestation Officer, Mr. F. J. Stayner, reports as follows:—

Pressure of work and absence from Headquarters on duty has again rendered the putting up a report for two months necessary in place of a monthly one. July and August are months at which greater Forestal activities are possible at our Zululand Station than elsewhere, and, after completing the harvesting of catch crops of mealies and ground nuts, Forester Tarboton, of Empangeni, has been filling in blanks all through the plantations and shifting cocoanuts to try and make a good though smaller plantation than that laid down originally. I visited this station in August and found evidences of good, solid work in the shape of thinned and cleaned plantations, roads, firebreaks, etc. It is to be regretted that all the trees of *Hevea* (Para rubber) planted out have succumbed, also those of *Castilloa* and *Funtumia* (West African rubber). *Ficus elastica* is alive but lingering. The only successful rubber at Empangeni so far is *Manihot glaziovii* (Ceara). Four plants of *Manihot d chotoma* are being given a trial, and I have had an exceptionally sheltered piece of ground broken and planted with Para which has been grown to plants 2 feet or more in the Nursery. If this fails I think rubber-growing, except Ceara, should be definitely abandoned there. During the period under review I attended agricultural shows at Durban and Camperdown and have been on inspection at 'Ngomi. During my absence at this station the fire which swept through portions of the

Cedara plantations occurred. It is impossible at the time of writing (September 1st) to estimate the amount of damage done, but I can confidently report that it will not be nearly as great as anticipated, the recovery taking place being little short of marvellous. I hope by the end of September to be able to state definitely what can be salvaged and what will have to be replanted. Five students were employed in the Nursery and plantation during August, and work for more than that number will be available till March. In July I delivered four lectures and gave three demonstrations to the officers of the Education Department assembled here for the vacation course. Forestry lectures to the students are now in progress, and I hope to start an advanced course in 1910 if sufficient of this year's class obtain the percentage of marks laid down as requisite for the passing from the Elementary Course.

Charcoal has been manufactured and a working sample sent the Public Works Department and the Natal Government Railways with a view to having its quality tested in a commercial way.

On August 2nd I visited the Central Gaol, Pietermaritzburg, in connection with the establishment of an Osier plantation, found the site proposed an excellent one, and recommended that the work be taken in hand at once; and as a result 10,000 cuttings have been planted, and employment should be provided for many prisoners in the making of baskets, etc., from the annual crops henceforth.

Continued and increasing interest is being developed by the public in afforestation and letters of advice are leaving my office daily from all parts of the Colony. The public should note that no fees are asked for this service.

CENTRAL EXPERIMENT FARM.

The month of July was, comparatively speaking, a very mild one for mid-winter. Various degrees of frost were registered on 20 days, and on four occasions the temperature fell as low as 23 degs. Fahr., but that was on the lowest part of the Farm. The maximum record was 77 degs. Sixty-four points of rain were recorded, of which 59 fell on the 6th of the month. This rain encouraged a growth of new grass on the burns, and, in spite of the check caused by frost, there was a green-picking to be had for the sheep.

The weather during the month of August was very seasonable, with a few light showers, which further encouraged the growth of young grass. During the early part of the month, however, cattle were feeling the effects of a bare veld, and had to be hand-fed with hay, stover and roots.

The first few days of July were occupied in selecting an exhibit for the Durban Show, from contributions from all Experiment Stations. The success of the exhibit is reflected by the award of a silver medal by the Society. Haired and woolled Persian sheep were also entered. Two-

rams and two ewes of the former breed secured 1st and 2nd prizes respectively. The woolled Persians were on exhibition only.

The turnips have given good yield this winter: Garton's Mammoth Purple Top, 23 tons 379 lb. per acre, and Garton's Green Globe, 20 tons 1,638 lb. This crop of turnips is the best I have seen grown on the Farm.

Some of the sheep were affected with nodular disease of the intestine, which was successfully treated with ten consecutive doses of Creoline.

The principal work on hand during the period under review was harvesting mealies, millet, potatoes and linseed, carting cobs and stalks, shelling mealies, threshing millet, husking and shredding mealies, grinding meal, etc.

A good acreage of ploughing was done in the vleis, and, considering the dryness of the soil, satisfactory work was performed with the four-furrow Ransome Sim disc-plough.

The area on which the buckwheat was grown last season was also ploughed, and a few days later a thick volunteer stand showed above ground, as a result of grain threshed out by the hailstorm in the month of March. As this may perhaps warrant being left as a crop, the ground has been harrowed and rolled, failing which, the area will be planted at an early date with beet and mangolds, either of which should do well in view of the early rains experienced.

Our previous experience in planting these crops in mid-summer (November and December) has not been encouraging, as they have been invariably swept off by the hot, dry winds of that season.

A good supply of vegetables has been obtained from the irrigated garden, and by the end of August further plantings of the following were completed:—Beans, beet, cabbage, cucumber, egg-plant, leek, lettuce, tomato, pumpkins, earth nuts, peas and potatoes.

IMPORTATION OF SHEEP.

Mr. J. J. McCall, wool expert, reports on sheep purchased at the beginning of September for the Central Experiment Farm:—

These sheep were imported by Mr. Jas. Piccione from Buenos Aires in August last, and comprise 391 Lincoln ewes, 474 Merino ewes, 107 Hampshire ewes, 21 Hampshire rams, and 34 Merino rams, a total of 1,027 sheep.

With the exception of the Hampshires, the sheep are in poor condition, which is accounted for by the facts that a drought had been prevailing in South America (Argentina) from the time they were lambed and the rough weather encountered on the voyage to South Africa.

The Lincolns (ewes only) carry nice fleeces (although at present full of vegetable matter), and, I believe, will fill out into large-framed

ewes with fair treatment. The whole consignment, with the exception of 4 Merino rams, are only rising 2-tooth and are under 12 months old.

The Merino ewes' wool varies from medium to very robust. They show the Rambouillet type in a most decided degree, they being bred by Senhor Umque, of Buenos Aires, from imported German Rambouillet rams.

The Merinos are of the plain-bodied type, although many of them show the heavy folds on the neck and shoulder, which is usually associated with the Australian type of Merino. The wool shows plenty of character and is very evenly grown both as regards density and staple.

Almost the same remarks apply to the Merino rams, with the exception that there are four rams much above the average.

The Hampshire rams are perfect in points and quality, and, though lacking quite sufficient size, I believe they will develop considerably in the next four months. I consider that they cannot be improved on in Natal for quality and constitution.

I may mention in connection with those Hamps that they were bred in the Province of Cordoba, in the north-eastern portion of the Argentine, several hundred miles up the La Plata, and both ewes and rams were bred from imported English rams. There is no relationship in blood between the ewes and the rams under notice.

WINKEL SPRUIT EXPERIMENT FARM.

During July and August the principal work engaging attention at this Station has been that of harvesting the various crops. Velvet beans, in addition to their value as a green manure crop, have furnished a heavy yield of grain, over 1,500 lbs. of seed having been obtained from $\frac{3}{4}$ of an acre of land, while another picking remains on the vines.

To meet the increased demand for pineapple suckers as a result of the successful exploitation of the Home market with this fruit, 27,000 suckers have been sold, which, with those required for an extension of the plantation at this Station, exhausts current supply.

The results of the sugar cane experiments are reported by the Manager, Mr. W. C. Johansen, as follows:—

The most noticeable feature in the results tabulated from the sugar cane experiments this season is the heavy and uniform yields obtained by the use of complete fertilisers on Plots 103, 104, 121 and 122. It is very evident that the supply of nitrogen is running low and that we will now obtain some idea as to the value of chemical nitrates in cane-growing.

Although Plots 106 and 124, manured with superphosphate and potash, still maintain their high yields they do not show the marked increase this season that the above-mentioned plots do, thus demonstrating that sulphate of ammonia combined with superphosphate and potash will eventually pay handsomely.

The average yield from the four plots was 46 tons 1,422 lbs per acre, the highest being 47 tons 950 lbs., and the lowest 46 tons 125 lbs.

On the other four plots, where sulphate of ammonia was used without one or other of the above-mentioned manures, no very marked difference is shown, thus proving that the use of both are essential to produce a maximum yield.

The use of nitrates on Plot 115 results in a marked improvement, but this is still a long way below the other averages.

In comparing the best average yields obtained from the manure and no manure plots for the three cuttings, it will be seen from the following figures that it pays well to use fertilisers:—

	tons	lbs.
The best average yield was from Manure Plots 106 and 124	40	164
The best average yield from No Manure Plots 102 and 120	34	535

showing a difference of nearly 6 tons per acre.

To manure with 120 lbs. of concentrated superphosphate, it would cost 10s. 9d. per acre, and 100 lbs. of potash 12s. per acre, or a total of £1 2s. 9d. per acre, and with an increase of 6 tons of cane a gain of £1 17s. 3d. per acre would be obtained, that is estimating cane at 10s. per ton.

Complete returns for the three seasons' cuttings are given herewith.

UBA CANE MANURE EXPERIMENT.

Plots 24 feet by 125 feet, equal 3,000 lbs. of an Acre.

No. of Plot.	Manures per Acre.	Cut Jan., 1906.		Cut Sept., 1907.		Cut Aug., 1909.	
		Yld. per plot.	Yield per Acre.	Yld. per plot.	Yield per Acre.	Yld. per plot.	Yield per Acre.
1/2 B	No Manure ...	lbs 2602	tns 1300	lbs 4028	tns 507	lbs 2844	tns 351
101	120 lbs. Sulphate of Ammonia ...	5797	36 462	7370	46 125	6257	39 212
	50 " Chloride of Potash ...						
	60 " Concentrated Superphosphate ...						
102	No Manure ...	5951	31 1137	7120	44 1000	6374	39 1675
	240 lbs. Sulphate of Ammonia ...						
103	120 " Concentrated Superphosphate ...	5958	37 475	6926	46 1575	7596	47 950
	100 " Chloride of Potash ...						
	360 " Sulphate of Ammonia ...						
104	180 " Concentrated Superphosphate ...	5697	35 1215	6282	39 525	7459	46 1237
	150 " Potash Chloride ...						
105	No Manure ...	5433	33 1912	6250	39 125	6953	43 912
	120 lbs. Concentrated Superphosphate ...						
106	100 " Potash Chloride ...	5854	36 1175	7007	43 1587	7286	45 1075
	240 " Sulphate of Ammonia ...						
107	100 " Potash Chloride ...	4951	30 1987	6226	38 1825	6629	41 862
108	No Manure ...	4660	29 250	6235	38 1937	6280	39 500
	240 lbs. Sulphate of Ammonia ...						
109	120 " Concentrated Superphosphate ...	4781	29 1762	6326	39 1075	5955	37 437
	120 " Concentrated Superphosphate ...						
110	120 " Concentrated Superphosphate ...	4607	28 1587	5997	37 962	6553	40 1912
111	No Manure ...	4336	27 200	5137	32 212	5516	34 950
112	300 lbs. Basic Slag ...	4515	28 437	5605	35 62	5704	35 1310
113	300 " Bone Dust ...	4903	30 1287	5818	34 725	6143	38 787
114	No Manure ...	3977	24 1712	5393	33 287	5854	36 1175

UBA CANE MANURE EXPERIMENT.—(Continued).

No. of Plot.	Manures per Acre.	Cut Jan., 1906.		Cut Sept., 1907.		Cut Aug., 1909.	
		Yld. per plot.	Yield per Acre.	Yld. per plot.	Yield per Acre.	Yld. per plot.	Yield per Acre.
115	200 lbs. Nitrate of Soda	lbs	tns lbs	lbs	tns lbs	lbs	tns lbs
	120 „ Concentrated Superphosphate	5644	35 550	5570	34 1625	6443	40 537
	136 „ Nitrate of Potash ...						
116	240 „ Sulphate of Ammonia						
	120 „ Concentrated Superphosphate	5262	32 1775	6299	39 737	6434	40 425
	100 „ Chloride of Potash ...						
	1000 „ Lime						
117	No Manure ...	4231	26 807	4517	28 462	5490	34 625
118	120 lbs. Concentrated Superphosphate	5653	35 662	5692	35 1150	5467	34 337
	1000 „ Lime ...						
½ B	No Manure ...	2443	30 1075	3220	40 500	2920	36 1000

UBA CANE MANURE EXPERIMENT.

Plots 24 feet by 145 feet, equal 2¼ths of an Acre.

No. of Plot.	Manures per Acre.	Cut Jan., 1906.		Cut Sept., 1907.		Cut Aug., 1909.	
		Yield per plot.	Yield per Acre.	Yield per plot.	Yield per Acre.	Yield per plot.	Yield per Acre.
½ B	No Manure ...	lbs	tns lbs	lbs	tns lbs	lbs	tns lbs
119	Same as Plot 101 ..	2300	28 1500	3678	45 1950	3432	42 1800
120	No Manure ...	5799	36 487	4879	30 987	6394	39 1925
121	Same as Plot 103 ..	4756	29 1450	4478	27 1975	5118	31 1975
122	„ „ 104 ..	5189	32 815	4261	26 1262	7370	46 125
123	No Manure ...	5408	33 1600	5702	35 1257	7470	46 1375
124	Same as Plot 106 ..	4450	27 1625	4931	30 1637	5781	36 262
125	„ „ 107 ..	6236	38 1950	5539	34 1237	6557	40 1962
126	No Manure ...	5318	33 475	4986	31 325	5518	34 975
127	Same as Plot 109 ..	5310	33 375	4699	29 737	4850	30 625
128	„ „ 110 ..	5577	34 1712	5304	33 300	5850	36 1125
129	No Manure ...	5529	34 1112	5172	32 650	6058	37 1725
130	Same as Plot 112 ..	5004	31 550	5275	32 1937	5333	33 662
131	„ „ 113 ..	5324	33 550	5426	33 1825	5725	35 1562
132	No Manure ...	5289	33 112	5642	35 525	5779	36 237
133	Same as Plot 115 ..	4680	29 500	5645	35 562	6087	38 87
134	„ „ 116 ..	4774	29 1675	5656	35 700	6191	38 1387
135	No Manure ...	5372	33 1150	5368	33 1100	5859	36 1237
136	Same as Plot 118 ...	3832	23 1900	4810	30 125	4625	28 1812
½ B	No Manure ...	4927	30 1587	4921	30 1512	4852	30 650
		2450	30 1250	2434	30 850	2072	25 1800

WEENEN EXPERIMENT STATION.

At this Station the Curator, Mr. E. R. Gessner, reports very favourably on the growth made by Federation wheat. This is in accord with results previously obtained when a yield of 2,014 lbs. of grain per acre was recorded. Of 30 varieties of barley, Manitoba appears to justify hopes of proving a quick-growing, heavy-yielding type, but it is yet too early to make any definite pronouncement.

An addition of 10 varieties of grape vines has been made to the Orchard at this Station, where fruit culture is a special feature. Six acres of Canadian Wonder beans have been planted between the rows of fruit trees; these, in addition to yielding a remunerative crop of beans, assist greatly in preventing soil erosion caused by the summer rains.

APICULTURE.

The Apiarist, Mr W. C. Mitchell, as a result of the lectures and demonstrations given during the recent vacation course, was asked to deliver a lecture at Ladysmith. His report is as follows:—

Leaving here by the midnight train on Tuesday, I arrived at Ladysmith at 6 a.m. on the following morning. Mr. Lister, to whom I am much indebted for making all the arrangements in connection with my visit, met me at the station. I would take this opportunity of bringing to your notice the very keen manner in which Mr. Lister has taken up the subject of apiculture as a result of the recent vacation course which he received at Cedara.

At 9 a.m. I interviewed the Headmaster of the Boys' School and arranged the following programme, which was duly carried out:—

Wednesday, 10.30 a.m., Lecture to Senior Boys. 1.30 p.m., Demonstration to same class.

Thursday, 11 a.m., Lecture to Senior Girls. 2 p.m., Demonstration to same class.

The demonstrations were held in the apiary of Mr. Buhr, who kindly placed his hives at my disposal for the purpose. At these lectures approximately 70 boys and 60 girls were present, all of whom showed a keen interest in the subject.

On Wednesday evening I delivered a lecture to some 30 ladies and gentlemen. In view of the fact that there were three other attractions in the town the same evening, I consider this a very satisfactory attendance. A resolution was passed at this meeting, which I am communicating to you in separate papers. My spare time was devoted to interviewing local bee-keepers, and I returned by the train arriving at Cedara at 1.34 a.m. Friday.

I find that much trouble has been experienced in the Ladysmith district from the depredations of a small black beetle. Mr. Leyler promised to secure me some specimens later on as there were none to be obtained at this time of the year.

There appears to be quite a boom in Ladysmith apiculture, which will, I am afraid, react adversely ere long, as I found that there was a tendency to begin on too large a scale. I advised doubling up weak colonies, reducing the number of stocks and making the remaining ones as strong as possible.

E. R. SAWER,

Director, Division of Agriculture and Forestry.

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

W. C. MITCHELL, Hon. Secretary, Cedara.

THE General Meeting, of which notice was given in last month's notes, will not be held in the offices of the Education Department as anticipated, but in the Natal Creamery Sitting Room, Longmarket Street, Maritzburg, through the kindness of Mr. McKellar, who has placed the room at the disposal of the Association. As the Secretary will be unable to advise all members individually, they are asked to make a special note of the fixture, viz., October 13th, at 11 a.m., Natal Creamery Sitting Room, Longmarket Street.

* * *

The principal items to be discussed were given last month, but I omitted to mention that if any member desires to bring forward any other subject I should be glad of an intimation to that effect in order to include it in the agenda.

* * *

All bee-keepers in South Africa are agreed that if foul brood once got a footing in this sub-continent it would cripple apiculture as an industry, owing to the large number of wild bees whose hives could not possibly be cleansed from the disease. Yet only one of the South African Colonies has enforced legislation governing the importation of bees, honey, wax (including foundation comb), and used bee hives and accessories! It is clearly the duty of this Association to make known its opinion on the subject of the introduction of bee diseases in no uncertain voice at our meeting on October 13th.

* * *

That foul brood is not the only danger to be guarded against is seen by perusing the following clipping from an English paper:—

Warning to Bee-keepers.—The Board of Agriculture and Fisheries desire to warn all bee-keepers that an outbreak of disease believed to be identical with the Isle of Wight bee disease has occurred in several hives in Buckinghamshire. The disease, which has destroyed almost all the bees in the Island from which it takes its name, is due to a bacillus closely resembling the bacillus of plague, and no remedy for it is known. It is of the utmost importance, therefore, that bee-keepers should take every precaution to prevent the disease spreading, and they are strongly advised to keep a careful watch for any signs of its appearance. A full descrip-

tion of the disease was published in the *Journal of the Board of Agriculture* for February, 1909, and bee-keepers who find symptoms of disease corresponding to the description there given should communicate with the Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W.

* * *

The above at least serves to indicate some of the difficulties of bee-keepers in a country that does not occupy the same happy position as ourselves in being free from disease, although it is highly improbable that this particular one will ever be introduced into South Africa, as an infested Colony would be entirely extinct before it ever reached these shores.

* * *

This question of legislation has a distinct connection with our honey market. How often has it occurred to local bee-keepers that whilst we are not fighting the imported article by offering a constant supply of Colonial honey, we are holding open the door to admit the very disease that will make our future impossible as far as honey production is concerned?

* * *

It is estimated that the proposed show to be held in April will incur an expenditure of twelve to fifteen pounds. A large portion of this must be raised by private subscription, but what is equally as important as financial assistance, is that members support the show by exhibiting. A draft prize-list will be published in these columns as early as possible after such has been arranged.

* * *

Several days of wet weather make a big drain on the reserve stores of any colony containing a lot of hungry brood. Any that are short of stores should be fed.

* * *

The Ladysmith bee-keepers are going strong. At a lecture delivered on the 26th of August, a resolution was passed in favour of forming a Ladysmith branch of the N.B.K.A. No further particulars have so far come to hand.

* * *

Mr. Lister, of the Boys' Government School, Ladysmith, has taken up apiculture enthusiastically. At his request, and by the favour of the Headmaster, a lecture was delivered to some 70 scholars at the above school on the 26th of August. The following day the same subject was dealt with at the Girls' Government School, through the kindness of

Miss Charlton, the Headmistress, when some 50 scholars were present. On each occasion the lecture, delivered in the morning, was followed, in the afternoon, by a demonstration in Mr. Buhr's apiary, when it was surprising to see how well the youngsters had grasped the main principles of the subject. I am much obliged to Mr. Buhr for placing his apiary at my disposal.

* * *

Quotation.—"Can you," I asked him as we parted, "after all these years of experience, lay down for beginners in beemanship one royal maxim of success above any other?"

He thought it over a little, the gun on his shoulder again.

"Well, they might take warning from this same King Solomon," he said, "and beware the foreign feminine element. Let British bee-keepers cease to import queen bees from Italy and elsewhere, and stick to the good old English black. All my bees are of this strain and mostly from one pure original Sussex stock. The English black bee is a more generous honey-maker in indifferent seasons; she does not swarm so determinedly, under proper treatment, as the Ligurians or Carniolans; and, above all, though she is not so handsome as some of her Continental rivals, she comes of a hardy northern race, and stands the ups and downs of the British winter better than any of the fantastic yellow-girdled crew from overseas."—Tickner Edwardes, in "The Bee-Master of Warrilow."

* * *

Let us echo the sentiments of the old bee-master in a practical manner by sticking to our native race.

DISTRICT NOTES.

Cedara.—Principal source of honey this month is the Stringy Bark, Gum, but bees also working on the usual assortment of garden flowers, Phlox, Verbena, Nicotiana, etc., pollen from Gums, Nasturtiums, Chick Weed, etc. No swarms have so far appeared.* The weather has been somewhat unfavourable for the bees; on 10 out of the first 15 days of September rain has been recorded.

Donnybrook.—Mr. Auld reports very little nectar coming in, but what little there is comes from Gums. Pollen being gathered from Wattle and Oak trees. Blind louse noticed in hives.

Fox Hill.—Mrs. Keytel reports pollen being gathered from Oak and Wattle trees and artificial pollen being collected from bran which had been placed at the hive entrance during the cold weather. This form of feeding artificial pollen has been highly spoken of. Colonies fairly strong but no swarms so far.

Farm and Garden Notes for October.

By GEO. CARTER, F.R.H.S.

THE perfect rains of September will have enabled all farmers to get well ahead with the ploughing and the general preparation of the ground for spring crops. Most of the ground will be required for mealies, no doubt, but in addition to mealies there are a good many crops which, although of secondary importance perhaps, it will be necessary to get sown very soon. There is winter food to consider, in the form of roots, and hay, and ensilage; and the sowing of grasses for more or less permanent pastures. The most important of the crops which should go in during October are the following:—

SUGAR BEETS AND MANGELS.

October will be found to be the best month in which to get these sown. Our farmers have been making the mistake of sowing these far too late, with the consequence that the roots have not time for full development and only half a crop is reaped. The reason for late planting may in some cases be expedient, that is, where this is looked upon as of secondary importance, and where it is felt that attention must be given to, say, mealies first. But with an early spring such as we have had this year, giving plenty of time for ploughing, there is no reason why this crop should not go in at the right time. The risk of failure in seeding (sunburn) is much lessened by early planting, and, if the season of rains happens to be a short one (it is not uncommon for rains to cease at the end of February), one is still sure of a good bite from the roots for the winter. Seed should be sown at the rate of about five pounds per acre, in drills 24 inches apart, and the plants thinned out to about a foot apart in the lines later.

CHICORY.

If the intention is to raise a crop of good roots for sale in the autumn the seed of this must go in now. This is not everybody's crop, however, and will not do well in all lands. As a general guide one may say that land which will give a good crop of sugar beets or carrots will also grow good chicory. Deep ploughing, manuring with stable manure, well rotted, thoroughly pulverising the soil, are the necessary points to remember. Better grow an acre well than five badly. Seed is sown in shallow drills 24 inches apart, at the rate of $1\frac{1}{2}$ lb. to an acre, and the seed covered only to a depth of from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch deep. After thinning the roots should stand six inches apart in the rows. Cultivation is necessary very frequently throughout the growing season. It is

not only the necessity of keeping the crop free from weeds which one has to consider, but also the conservation of moisture in the soil by means of a dust mulch in dry weather.

TEOSINTE.

(Reana, or *Eucolena, luxureans*).—This is really a coast, or very warm midlands, crop, and will seldom mature seed above an elevation of 2,000 feet. It is necessary to sow as early as possible in the spring, even if grown only for ensilage purposes. It makes an excellent fodder for cutting green, and for this purpose may be cut two or three times during the season in the warmer districts. But perhaps its full value is as a silage filler, for it not only yields very heavily, but also contains from 8 to 10 per cent. of sugar. Drills should be 4 feet apart, and the seed sown thinly, so that the plants may stand at 15 to 24 inches apart in the rows eventually. This crop only requires about two pounds of good seed to the acre.

MILLETS.

All classes of millet may be sown this month. Bullrush (Nyalute or Grey Pearl) for ensilage purposes; Japanese for hay in the more moist and low-lying lands; Golden and Boer manna for hay where there is dry land and a rather scarce rainfall. Perhaps the Bullrush variety is best sown in drills three feet apart, the seed being sown very thinly, say six pounds to an acre, for the plant is a very large one. Japanese and Golden require 15 to 20 lbs. to an acre, sown broadcast, while Boer manna is sown broadcast at the rate of from 6 to 10 lbs. per acre.

SUNFLOWER.

This requires a good soil and good feeding, and indeed the same may be said of all oil-bearing seed crops. It is waste time putting it into poor land. The black seeded variety is by far the better one, comparing this with the striped Russian, throwing better filled seed, and a much less proportion of husk to seed. The sunflower cannot be said to be a good marketing crop, and will never be so until we have better uses for the seed than mere poultry feeding. But it is a very useful crop on the farm itself. Ten pounds of seed will sow an acre. Drills should be $3\frac{1}{2}$ feet apart, and the plants 12 to 18 inches apart in the rows.

GREEN MANURING CROPS.

Some of the legumes used for the purpose of soil renovation are tender summer plants, and require to be sown in October, or at the very latest November. Cow peas, soy beans, and velvet beans are the most important of these. Cow peas are of two types, a bush type and a runner. The best bush type for Natal is the "New Era," and some farmers prefer this because it is easier to plough under when fully grown. It is sown in drills three feet apart, at the rate of 40 lbs. to the acre.

Of the running varieties I know of nothing better than our old "Kafir bean," black seeded, a most vigorous and large grower. Drills for this may also be three feet apart, but only from 15 to 20 lbs. of seed will be required to the acre. For a crop of soy beans sow 40 lbs. to an acre, in drills $3\frac{1}{2}$ feet apart, and cultivate the same as for ordinary French beans. (The velvet bean is best as a coast crop, and has done no good in the higher districts so far. From ten to fifteen pounds of seed will sow an acre.

Where there is a piece of broken up land which will not be required until January it will be advisable to sow a crop of Japanese buckwheat as a catch-crop. This will mature seed in three months, or may be ploughed in as green manure to help along the autumn crop later.

GRASSES.

Now that our seasons have righted again and we have good spring rains, there are very good reasons for sowing most of the grass crops in October, instead of waiting until January. There is less risk now of losing the seeding by sunburn; a longer season for the formation of a good solid sod before the dry weather; and, where the food is intended for cattle, a much greater quantity of grass would be available for the first winter's grazing. This may not apply to Italian rye grass, with which the scheme is to get the crop to last two winters. Teff grass, for hay-making only, will yield two crops of hay if sown in October. This is sown at the rate of 4 lbs. per acre, and may be sown on rather foul land, for it is an excellent smother crop. Paspalum, Toowoomba Canary grass, Chicory, Burnett, Tall Fescue, and some others, are all the better for a long summer's growth. When sowing Paspalum try mixing four pounds of white clover with the ten pounds of seed required to the acre.

THE FARM GARDEN.

During the next three months I am afraid the garden will be left in the hands of the ladies, for the men will have plenty to do in the fields. And this happens at a time when the weeds are growing in profusion, and the hoe must be kept going continuously. The weeds *must* be kept down, for they are shocking robbers. The ground between the crops will also need loosening up after each heavy rain to keep the surface porous.

If the garden needs a hedge around it you could not do better than put in the plants this month. These may be Japanese Privet, Arbour Vitae (*Thuja orientalis*), Oyster Bay Pine, or Cupressus macrocarpa. The privet is all right where is plenty of room, but if the garden is a small one DON'T PLANT PRIVET, for the roots will forage for food to a distance of six feet or more beyond the hedge itself, and will keep the ground as dry as a bone for a longer distance still. Garden crops need

constant defence from such attacks, by a cutting back of the roots occasionally. If rooted plants are to be put in plant them at a foot apart, and well down so that the bottom of the hedge will be filled in, then chop off the tops all along in a straight line to within twelve inches of the ground level. This may seem drastic now, but you will see the reason for it next year. If cuttings are obtained from a neighbour put them in nine inches below the soil and three inches above, and at an angle of 45 degrees. Thuyas, or Cyprusses may be planted at 18 inches apart, for they will fill in at the bottom much better than privet.

Sowings should be made this month of succession lots of cabbage (Enfield Market and Sugar Loaf now), beets, carrots, lettuces, sugar corn, tomatoes, marrows, and cucumbers. In flowers any of the tender annuals may be sown. Plants and tubers of the new varieties of Chrysanthemums and Dahlias should be obtained from your nurserymen. The Hollyhocks will need staking to protect them from the high storm winds.

LAWN MAKING.

If you want to make a lawn in front of the home this season the work should be got in hand this month. One must think of beauty about a home as well as utility, and nothing in the world finishes off the appearance of the outside of the home like a good patch of well-kept grass. There is plenty of room about the farm house, and many of our farm homes would be much improved in appearance by the cutting away from the house front of the mass of rough shrubber (or wattles) and the formation in their place of a clear stretch of grass. I do not mean to assert that shelter from rough weather is unnecessary, and quite acknowledge that trees are the best shelter. But such shelter will be just as effective at a greater distance from the house. The house front should not be hidden. It should be the centre of a picture, the foreground of which is good green sward.

The first thing to be done in preparing for a lawn is to trench the ground well and to an equal depth all over, at the same time getting plenty of manure. Use stable manure if available, for kraal manure will be full of all sorts of nasty weeds. The ground must then be levelled and firmed well ready for seed or roots. I want to lay stress on this preparation, for in this lies success or failure. If the "boy" does it **SEE THAT HE DOES IT WELL**. The next point to be thought of is what kind of grass one had better put in. This depends much upon the climate one lives in. For a cold district it is possible to use a mixture of English grasses, but this mixture should be limited to those varieties which we know will grow, and grow well, in South Africa. A simple mixture of Meadow Fescue, Sheep's Fescue, *Poa pratensis*, Rye grass and white clover is all we require. The balance of an "English" lawn grass mixture is wasted, burned off by the summer sun during the first season

even if it gets through from seed at all. This should be sown at the rate of from 60 to 80 lbs. to the acre—very thickly, for we want a thick, close sward.

Poa pratensis makes an excellent lawn if sown alone, the best of all lawns probably, sown at the rate of 60 lbs. per acre. But with this grass one must be patient, for the germination is slow, and not until the second season may one expect to get the result desired. This is a grass for those who will take pains with the work, and are prepared to work and wait for a good thing.

In the midlands and on the coast the best grass is *Cynodon dactylon*, which is very hard, deep-rooting, and quite springy underfoot. *You have this grass growing on your farm now*, probably all over the yard. It is the compact running grass growing just outside the cattle kraal, and which you will often find getting into the flower beds, much to your vexation. It may not look very well there, but once put it into well-prepared ground, and attend to it properly, and you will be astonished at its beauty. The way to start a lawn with this is to cut little pieces of the sod, and plant these in the prepared ground in lines twelve inches apart, then level well again. In six or eight weeks the ground will be covered all over, and ready for cutting. I do not mention the coast "Vine grass," as it is called, for it is a poor, weak thing, comparatively. It will not wear, will not stand drought, and the colour is too pale for a good effect even when at its best.

After care of the lawn means a little weeding at first, regular rolling after rains, and, when once fairly grown, cutting ONCE A WEEK. If the lawn is made of the *Cynodon* grass (*Couch*) it is imperative that not a single week be missed in mowing during the growing season, for if it be missed once the colour will be spoilt for a full month. With this grass also the borders will need trimming occasionally to keep it within due bounds.

A few good cows will make more money every month than twice as many fair or poor ones.

No class of farm animals is so well fitted to supply the farmer's table with fresh meat at any season of the year as sheep, unless it be fowls.

Reviews of Books.

A FARMERS' HANDBOOK.

"THE SOUTH AFRICAN FARMER'S GUIDE AND HANDBOOK" (Third Issue). Reprinted from the *Natal Witness*. Pietermaritzburg: P. Davis & Sons.

For some years past the *Natal Witness* has made a special feature of the publication of articles of interest to farmers, columns being devoted every day to this purpose. We had occasion a short time back to comment upon the appearance, from Messrs. P. Davis & Son's press, of a reprint in book form of some fifty or more "interviews" with farmers that originally appeared in the "Farmers' Day" columns of the *Witness*; and we now have the pleasure of welcoming the appearance of the third issue of the now well-known "South African Farmer's Guide and Handbook," which is the result of a careful selection from the large quantity of useful matter which appeared in the "Farmers' Day" columns during 1908. The book is divided into sections dealing respectively with Cattle and Dairy, Sheep and Wool, Goats, Pigs, Horses, Stock-Feeding, Stock Diseases, Ostriches, Poultry and Eggs, Bees, Soil and Fertilisers, Cereal Crops, The Orchard, The Kitchen Garden, The Flower Garden, Fibre, Wattles, Tobacco, Pests, and "Miscellaneous," so that it is fairly comprehensive in its range of subjects. In general arrangement the present issue is similar to its immediate predecessor. The classification of subjects, however, has been extended by the addition of six new sections, dealing respectively with "Stock Feeding," "Stock Diseases," "Ostriches," "Wattles," "Tobacco," and "Pests." Of these, the two first and also the last-named have to do with subjects similar to those treated of under other headings, but their contents are nevertheless, as the Introduction remarks, of too wide and general a scope to be covered by any single one of the latter; and the same remark applies to some extent to the older sections entitled "Soil and Fertilisers" and "Miscellaneous." As a result, no section necessarily contains all that the volume has to say on the subject indicated in its headline; but the usual index which is provided—a full and excellent one—renders easy the discovery of such items as, for the reason stated, have not been brought into closer classification.

The book will fill a useful place on the South African farmer's bookshelf, and all who obtained the first and second issues should possess themselves of a copy of this the third number.

AGRICULTURAL EDUCATION.

“A RURAL READER FOR SOUTH AFRICA.” By Alexander B. Lamont, M.A., B.Sc. London: Macmillan & Co., Ltd. 1909.

A new spirit is beginning to pervade South Africa: the spirit of agricultural education. A quickening of the national pulse—may we not now speak of the “South African Nation”?—is becoming everywhere observable concurrently with the recognition of the growing importance of South Africa as an agricultural country; we are beginning to realise that the idea of technical education must be extended to agriculture quite as much as to other industries and professions. Once Agriculture was an art—which is a polite way of saying that the rule of thumb was its guiding principle;—now it has been reduced (or perhaps we should say elevated) to a science; and this science of agriculture has come to be nothing less than a working knowledge of a number of sciences the bounds of which every year are being extended by a huge army of workers in the laboratory and in the field. To the farmer the results of scientific investigations come in a practical form, and he who can and will make use of them and thereby increase the income yielded by his capital.

Progressive minds among our farming population are beginning to realise, not merely the importance of a scientific knowledge of agriculture, but also the importance of the education of children along lines which will fit them for farming in the years to come. There are not wanting indeed those who would introduce the study of agriculture into the curriculum of all our primary schools, but for the majority of progressive farmers it may be said that they realise the very great benefits which would in the future accrue to the country from the introduction of agricultural theory into all the country schools. This is an end which, we will venture here to prophesy, will probably be realised in the very near future throughout the South African Union, and we prophesy this in view of the rapidly growing public feeling in favour of agricultural education upon a broad basis. This growing feeling has been most marked during the past six months, but the movement in favour of agricultural education in South Africa is by no means a new one although it has come to public notice to a marked extent of late. In 1906 the Western Province Agricultural Society (Cape Colony) had a suggestion made to it by Dr. Muir to the effect that a school reader should be prepared and published embodying the elements of rural economy with special reference to South African conditions. This suggestion, made in 1906, has now taken practical shape, and, although the Society referred to has not played any part in the preparation of the book, a rural reader has appeared under the auspices of the Cape Education De-

partment. Mr. Lamont has undertaken a worthy and useful task and he has performed it well. The main object of the book he tells us in his preface, is "to stimulate the powers of observation of the children in our rural schools, and so to develop in them a more intelligent interest in what is going on around them," and he has certainly succeeded in investing his book with a simplicity and interest which is bound to hold the attention of school children and awaken in them an interest in their surroundings which will develop into a real love for the country as they grow older, besides enabling them to obtain an insight into the workings of some of the natural phenomena connected with farm life and generally to gain a little knowledge of the elements of agricultural science.

An analysis of the contents will give some idea of the scope of the volume. The book is divided into three parts, the first part consisting of general chapters, the second containing chapters on "Animals of the Farm," and the third part dealing with "Plants and their Cultivation," and the chapters into which these three parts are again divided deal respectively with the Physical Features of Cape Colony, the Climate of Cape Colony, Water and Water-Supply, Irrigation and Drainage, Farms and Farming, Some Wild Animals, Birds, Reptiles, Frogs and Fishes, Boneless Animals, the Locust, Some Relatives of the Spider, Food and its Digestion, the Horse Family, the Horse, Breeds of Horses, Treatment of the Horse, the Horse in Health and Sickness, the Ox, Breeds of Cattle, Treatment and Feeding of Cattle, Diseases of Cattle, the Dairy Cow, Milk, Butter, Cheese, the Sheep, Sheep Farming, Wool, the Goat, the Pig, the Ostrich, Ostrich Feathers, Poultry, Management of Poultry, Bees, Management of Bees, the Soil, Plant Food in the Soil, Tillage of the Soil, the Life of the Plant, the Flower and the Fruit, Crops of the Farm—Mealies, Other Crops used for Grain and Forage, wheat, Lucerne, Pasture Plants, Storage of Forage Crops, Root Crops, Tobacco, the Garden, Garden Crops, Fruit-Growing, Pruning, Budding, and Grafting, Orchard Fruits, the Grape, the Veld, the Plants of the Veld, and Forest Trees. Four coloured plates are included, together with 165 illustrations in the text.

This is a book which deserves a place in all the rural schools of South Africa, and its introduction into some of the classes of the urban schools would also prove advantageous. The book is printed in good clear type and got up to stand hard wear.

Give your cows their rest when butter-fat is lowest, farm work most pressing, and flies more trying.

The Position of East Coast Fever.

LIST OF OUTBREAKS DURING AUGUST-SEPTEMBER.

THE following is a list of outbreaks of East Coast Fever that have occurred during the period 21st August to 20th September, with the exception, as usual, of Zululand, Victoria County, Umsinga, Vryheid, Ngotshe, Babanango and Paulpietersburg.

Dundee District.—Outbreaks on farms "Lennox," east of main line, and "Fairy Glen," sub-division of "Burnside," west of main line.

Umvoti District.—Outbreaks on farms "Southfield" sub-division of "Haartebeestevlakte," portion of "Redcliffe" sub-division of "Middle-drift," "Gracelands" sub-division of "Roodebokvlakte," "Welgevonden," and "Boschfontein."

Klip River District.—Outbreaks on farms "Schoonfontein," west of main line, "Nooitgedacht," west of main line, and "Woodcot" sub-division of "The Junction," west of main line.

Utrecht District.—Outbreak on farm "Koppie Alleen."

Krantskop District.—Outbreaks on farms "Klein Dornhoek," "Albany" sub-division of "Kranskop and Cornwall," Mrs. H. L. van Rooyen's portion of "Krantskop," and amongst Natives' cattle on "Paul's Rest," and on farm "Wonderfontein."

Umgeni District.—Outbreak on farms "Mountain Holm," "Mount Rule" sub-division of "Lamond Vale," "Mealiefontein," and amongst D. Malcolm's cattle on "Nel's Rust," R. D. Malcolm's cattle on "Nel's Rust," D. Holmes' cattle on "Nel's Rust," and Jos. Baynes' cattle on "Nel's Rust."

Lion's River District.—Outbreaks amongst Mrs. Alfred Curry's cattle on "Magtenburg," and F. W. Merton's cattle on "The Start," east of the main line.

New Hanover District.—Outbreaks on farms "Boilingfontein," "Kleinitz" sub-division of "Cooling," "Haselmere" sub-division of "Jaagbaan," "Baythorpe" sub-division of "Dalton," "Waterfall," "Herzog" sub-division of "Waterfall," "Home Lodge" sub-division of "Broughton," "Krondraai," "Laager Farm" sub-division of "Klein Noodsberg," and amongst N. Muirhead's cattle on "Lonwood Lea," C. Westbrook's cattle on "Broughton," and H. Rosenbrack's cattle on "Dalton."

Camperdown District.—Outbreak at Killarney Waterworks on farm "Killarney Isles."

Upper Umkomanzi District.—Outbreak on farm "Fielden," and amongst Mr. J. Mapstone's cattle on "Brasfort Park."

Ixopo District.—Outbreak on farm "Gorton No. 1."

Correspondence.

DENATURED ALCOHOL.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—The prominence which has been given by your journal to the subject of alcohol for industrial purposes, and the light which has been thrown upon its great possibilities as an industry eminently fitted for Natal, will doubtless lead to further enquiries on behalf of those to whom the subject has a practical interest; and it occurs to me that it may be helpful to call attention to a publication entitled "Denatured or Industrial Alcohol," by Rufus Frost Herrick, recently published by Jno. Wiley and Sons, New York, and Chapman & Hall, London.

It is the latest, if not the *only*, book dealing fully with the subject. It is a treatise on the history, manufacture, composition, uses and possibilities of industrial alcohol. It contains the laws and regulations governing its use in the various countries where the excise laws permit of the adoption of alcohol for light, heat and industrial purposes. It is eminently a *practical* book and has been compiled for the use of the engineer, chemist, manufacturers of alcohol and of alcohol-making apparatus, including alcohol motors, engines, illuminating lamps, heating and cooking stoves. The comparative values of the numerous raw materials, *viz.*, corn, rye, potatoes, molasses, etc., and the conditions best suited to each, is fully dealt with. The book is plentifully illustrated, the print is good and it is well got up generally. The printed matter, appendices and index fill 515 pages. The selling price is 7s. 6d.

It is a capital work. I particularly recommend it to our sugar planters. To farmers it would be most valuable; so much so that I venture to suggest that each farmers' association throughout the Colony should obtain at least one copy.

The principals and managers of large houses dealing in agricultural plant, motor traction, heating and lighting apparatus would also find a reference to its pages directly to their advantage, while Ministers of the Crown, members of the Legislative Assembly, Government officials or others desirous of studying the subject of denatured alcohol with a view to the introduction of a law governing its use in the Colony, will, I feel sure, find within the covers of Herrick's book all that is necessary or could be desired.

It is not, however, a book to be lightly perused, but is a highly useful work of reference and one for the careful study of those to whom the subject or any of its various branches has a direct interest.

The potentialities of industrial alcohol, its uses and manufactures, are so great and so far-reaching, and yet so immediately at our hand, that it is earnestly to be hoped our Colony will at an early date follow the notable examples of Germany and the United States of America, where by the enactment of legislation permitting the general use of tax-free denatured alcohol for industrial, etc., purposes, numerous profitable industries have been developed and useful and at the same time healthful occupation provided their inhabitants.—Yours, etc.,

J. F. E. BARNES.

Maritzburg.

Held Over.

THIS month the demands upon our space have, perhaps, been larger than they have ever been before, chiefly owing to the amount of space taken up with the report of the proceedings of the Inter-Colonial Agricultural Union. As a result we have been obliged to hold over three of our special features, *viz.*, "Among the Farmers," "Exchange Reviews," and "Science and the Farmer," besides a number of articles, including Mr. Pitchford's paper on the Breeding of Army Remounts and Saddle Horses, "The Seasoning and Characters of Natal Native Timbers," by C. W. Chilvers, "Recipes for Maize Dishes," etc., all of which will appear in our next issue.

The state of the bowels should be carefully attended to during the last fortnight of pregnancy of the cow. Constipation is one of the great causes of milk fever; and to prevent this, the simplest, the safest, and we believe the best plan, is to give the cow a pretty liberal supply of oilcake, or of other food having a laxative tendency. Feeding with large supplies of cold roots should be avoided, an occasional warmish mash being given with great advantage.—*Martin Doyle and John Darton* ("Cottage and Dairy Farming").

THE FARMER BOYS' PAGES.

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Conducted by "ARATOR."

* * *Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.o. Editor, "Natal Agricultural Journal," Maritzburg.*

"Arator" to His Friends.

THIS month we have a continuation of the three series of articles commenced in the last number, viz., "Implements of the Farm," "Agricultural Chemistry for Beginners" and "A Chat about the Soil," besides a number of short notes, etc. Those who are reading the first of these series—and I hope all of you are—will, I think, be pleased to hear that the Editor is arranging for the publication of a series of articles, well illustrated, on farming implements and machinery, covering all kinds of implements, from plough to harvesting machinery, besides dairy appliances, sorting and grading machinery, wool and hay presses, and so forth. The first article will, I believe, appear in the next number of the *Journal*, and will deal with ploughs. I strongly advise all readers of the FARMER BOYS' PAGES to study these machinery articles carefully as they appear. They will then be ready for practical study of machinery at the agricultural shows next year.

* * *

I have something else to announce, which I think will be received with satisfaction by readers of these PAGES, as well as, perhaps, by some of the more experienced readers of the *Journal* who happen to glance through these PAGES. At an early date—perhaps in the next issue, but at any rate very soon—I am going to publish the first of a series of articles on FARM PESTS of Natal, with hints as to their control and eradication. Like the farmers of all other countries, the farmers of Natal have a

number of insect and fungus pests to contend with, and every young farmer should know something about the commonest of these pests at least, and should know what steps can be taken to get rid of them or at least control them. These articles will give the required information in the simplest and least technical manner, and will, I hope, be found useful not only by the younger readers of these PAGES but by some of the older and more experienced ones also.

* * *

Elsewhere in the present number of the *Journal* readers will find a reference to a book which has lately been issued under the auspices of the Education Department of Cape Colony, called "A Rural Reader for South Africa." This is a book which I would advise you to get, as you will find much in it that is helpful in your studies. Various farming subjects (you will find a list of the contents in the notice referred to above) are discussed, in a light, interesting way, and you will find nothing whatever "dry" in the book. Some of the chapters some of you may find rather elementary, but you will nevertheless find much in other parts of the book that is interesting and instructive. I have no doubt the book is obtainable from any of the Maritzburg and Durban booksellers.

* * *

Once more let me invite all readers to make free use of these PAGES for inquiries, interchange of ideas and experiences, comments, and so forth. If you have any trouble, if there is any particular point in the articles appearing in these PAGES about which you are not clear, or if you want anything explained, write to me, and if your inquiry is of sufficient general interest I will publish a reply in these PAGES, if not, I will reply to you by letter.

* * *

Address your letters to "ARATOR," care of Editor, *Natal Agricultural Journal*, Maritzburg.

Implements of the Farm.

II.—PLOUGHING AND SUBSOILING.

The plough has a three-fold action: first, there is the vertical cut by the coulter, then we have the horizontal cut made by the share, and lastly we have the throwing over by the mouldboard of the earth thus cut.

Furrows are of two kinds: rectangular and crested. In the rectangular furrow a wide slice is taken by the plough each time, and the furrow slice is not completely turned over—it is, in fact, laid too much

on its back, with the result that often all the vegetation is not buried, while, even though it may be, not sufficient earth is obtainable for the covering of the seed as in the second or crested form of furrow. The rectangular furrow has, however, at least three advantages which must not be overlooked. These are, first, that the largest amount of soil can be turned over with the least expenditure of labour; second, a greater surface is exposed to the action of the atmosphere; and, third, a considerable saving of time in ploughing is effected owing to the furrow being wider than in the crested form of furrow.

In the crested form of furrow the furrow is cut in an irregular form, unequal in depth at the two sides. When this furrow is turned over it offers a sharp crest. The advantages of this form of furrow are that the vegetation is buried more completely, there is less chance of the furrow breaking open again, and more mould is obtained, thus requiring less harrowing for the purpose of covering the seed.

The depth at which the plough is to cut may be regulated in various ways. The "bridle" or "ploughhead" may be adjusted so as to alter the line of draught, as indicated in the last article, the coulter may be slanted (which will increase the depth of ploughing), the share may be lengthened or shortened, the land-wheel (in the case of wheel ploughs) may be raised or lowered, and the distance of the animals from the plough increased or diminished as it is desired that the plough should run deep or shallow.

There are many different kinds of makes of ploughs, but I do not propose to discuss them here as in the next and subsequent issues of the *Journal* there will be fully illustrated articles describing all the various kinds of ploughs, besides other farm implements, that are obtainable in Natal, and I would recommend readers of the *FARMER BOYS' PAGES* to look out for these articles and study them carefully.

When a field has been ploughed to the same depth for a number of years, a hard "pan," as it is called, or bottom is formed, which acts as a barrier to the roots of the deeper-rooted crops. It is also often desirable to stir up the lower portions of the soil, without bringing them up to the surface (the objection to this being that the lower layers often contain poisonous compounds that are detrimental to plant life), in order to admit air and water more freely. This stirring of the lower soil is done by means of what is called a *subsoiler*. This subsoiler consists of a large knif or *tine* fastened on to the beam of an ordinary plough just in front of the share, which rips up the bottom of the furrow just before the new furrow-slice is turned over. Another method of subsoiling is that of using two ploughs, one an ordinary one, and the other a special one that follows in the furrow of the ordinary plough and stirs up the bottom several inches down without bringing the soil up to the top.

A Chat about the Soil.

II.—THE COMPOSITION OF THE SOIL.

Having noticed how the soil was formed originally, and how it is still being formed, we may now devote a little study to the question of the composition of the soil. This we can conveniently do from five points of view: we can examine its structure, its proximate constituents, its organic and inorganic parts, its chemical composition, and its soluble and insoluble ingredients. We will accordingly study the composition of the soil under each of these heads in turn.

THE STRUCTURE OF THE SOIL.

An examination of any soil that has not been disturbed by tillage operations or digging shows it to be composed of layers, which are always in the same order, no matter what soil it is or where it may be. We can best make this examination somewhere where digging operations have been going on revealing a section of the soil—railway cuttings often afford a very good example. We find, on examining such a section, that there is a grass or vegetable layer about three inches at the top—turf, it is called. Then, below this, we find a layer of soil proper, from a few inches to a foot or more in depth. Below this, again, in some cases, is what is called the “subsoil.” I say “in some cases,” because there are cases in which there is no subsoil at all. On the other hand, the subsoil may extend downwards to a great depth. You can distinguish the subsoil from the soil and turf by the fact of its being lighter in colour. Sometimes, in the lower portions of the subsoil, or, where the subsoil is absent, immediately below the soil proper, we have “rubble,” or broken rock mixed up with the earth. Then, underlying all, there is solid rock, from which the overlying soil has been formed.

These are the structural divisions of a soil. They do not all exist in every soil, but when they do occur they are always in the same order. Sometimes, whilst the different divisions can be seen, it is impossible to find any actual line of separation between one division and the next, the various parts grading insensibly into each other.

PROXIMATE CONSTITUENTS.

The second point of view from which we can examine the composition of a soil is that of its “proximate constituents,” or ingredients. These are five in number, *viz.*: Stones, sand, clay, lime, and humus. It is on the proportion of these constituent parts that the farmer bases his opinion of the value of a soil, so far as its mechanical condition is concerned, for agricultural purposes; and it forms, in fact, the basis of classification of soils for the purposes of classification and description.

There are endless varieties of soils, but we can include every soil in one or other of these seven classes:—

- | | |
|-------------------------|-----------------------|
| (1). <i>Sandy.</i> | (2). <i>Loamy.</i> |
| (3). <i>Clayey.</i> | (4). <i>Marly.</i> |
| (5). <i>Calcareous.</i> | (6). <i>Gravelly.</i> |

(7). *Humous.*

How we describe a soil, depends upon the relative proportions of its five proximate constituents. For instance, if humus predominates, we call it a *humous* or *peaty* soil; if sand is a large constituent, we term it a *sandy* soil. It is, of course, impossible to give hard-and-fast percentages of constituents for each class of soil, but we can decide upon approximate proportions which will assist us in classifying soils that come beneath our notice. Primrose McConnell gives the following percentages as indicating the limits of each class:—

Sandy soil contains over 90 per cent. of Sand.

Sandy loam contains from 80 to 90 per cent. of Sand.

Loamy soil contains from 70 to 80 per cent. Sand.

Clayey loam contains from 30 to 50 per cent. of Clay.

Clayey soil contains over 50 per cent. of Clay.

Marly soil contains from 5 to 20 per cent. of Lime.

Calcareous soil contains over 20 per cent. Lime.

Humous soil contains over 5 per cent. of Organic Matter.

Before going on to the next branch of our subject we will examine very briefly the five proximate constituents of the soil, already named, viz.: Stones (including gravel), sand, clay, lime, and humus.

Stones and Gravel.—These, of course, are fragments of the original rock from which the soil has been formed. These are constantly being broken up by the weathering action already described, thus adding to the mineral content of the soil.

Sand.—Pure sand is quartz or silica in small particles, which have been rounded by the action of water.

Clay.—Clay is the hydrated silica of alumina. It comprises the sticky, plastic part of the soil. Too much clay makes a soil "heavy." The particles of clay are very small indeed; of those of ordinary size it would take 5,000, placed side by side, to occupy a linear inch.

Lime.—Every fertile soil must contain lime, even if only a small proportion. Lime makes stiff soil (such as clayey soils) more crumbly and friable, and is therefore added to improve such soils.

Humus.—Humus consists of animal and vegetable matter, which, decaying, have accumulated in the soil and mixed with the mineral constituents. All fertile soils contain some humus.

THE ORGANIC AND INORGANIC PARTS OF THE SOIL.

If you take a quantity of dry soil on a shovel and heat it over a fire to a red heat, part of the soil will burn away, while a portion will remain in the shovel and will not burn. The part which burns away is called the "organic" part of the soil; the portion which remains is the "inorganic."

What proportion will burn away, in any given soil, depends upon the amount of humus, or decayed organic matter, present in that soil. In a peaty soil there is sometimes as much as 90 per cent. of humus, so that if a sample of such soil were burned by far the larger part of it would disappear into the air, leaving a relatively small amount of inorganic or mineral matter.

CHEMICAL COMPOSITION OF THE SOIL.

In burning a quantity of soil, as described above, a separation, as we have seen, is effected: part of the soil disappears and part remains on the shovel in spite of the burning. Now, the part that disappears consists of carbon, hydrogen, oxygen, nitrogen; whilst the part of the soil which remains may be composed of any or all of the following substances (I give the chemical symbol in each case, so that those who are studying the chemistry articles may understand their composition): *Silica* (SiO_2), *alumina* (Al_2O_3), *ferric oxide* (Fe_2O_3), *lime* (CaO), *magnesia* (MgO), *potash* (K_2O), *soda* (Na_2O), *carbonic acid*—anhydride (CO_2), *sulphuric acid*—anhydride (SO_3), *phosphoric acid*—anhydride, (P_2O_5), and *chlorine* (Cl). There may also be traces of *manganese*, *bromine*, *iodine*, and *fluorine*. The chemist can analyse the soil, and he can tell you, not only what elements a given sample of soil contains, but also in what proportion they exist.

If we burn some vegetable matter—say, a plant—in the same way as we have burned our soil, we shall get a quantity of ash; and if we get a chemist to analyse this ash we shall find that it contains many of the substances just named: in fact, it may contain portions of all of them except alumina. The plant evidently obtained them from the soil when growing: and in this way we learn something about the good requirements of plants.

It does not, however, follow that because a plant contains portions of all these fourteen substances, they are all necessary to the growth of the plant. As a matter of fact, the important ones are phosphoric acid, potash, lime, ferric oxide, magnesia and sulphuric acid, as well as nitrogen, which is obtained, directly or indirectly, from the air. The other substances are found in the plant simply because, being present in the soil, they are absorbed by the roots of the plant, since the roots suck up all the soluble salts that come within their reach.

SOLUBLE AND INSOLUBLE INGREDIENTS.

The various chemical ingredients of the soil cannot be made use of by plants until they have been converted into soluble salts. This means that, although there may be considerable quantities of phosphoric acid present in a soluble, and so available, form before crops can use it.

You can examine the soluble salts in a soil for yourself by means of a simple experiment. Put a quantity of soil in a bucket and mix it up with several times its bulk of water. Let the soil soak for some time, thoroughly mixing and stirring it up. Then filter off the water and place it in a shallow basin to evaporate. When all the water has evaporated you will find at the bottom of the basin a small quantity of white powder. This powder is saline matter, and is the soluble part of the soil—the portion available for use by plants. The soil remaining after filtering is the insoluble portion.

These soluble salts form a very small proportion of the whole soil, rarely exceeding 0.25 per cent. An acre of soil, an inch in depth, thus contains about five cwt. of these salts, or two tons for eight inches' depth.

The plants themselves, however, are able, by the acid reaction of their roots, to dissolve out some more matter for their own use. Chemists can ascertain approximately how much the plants can make use of, by using acids instead of water to dissolve out salts. For this purpose a two per cent. solution of citric acid is generally used.

Sheep Notes.

A COMPACT fleece is a protection to the animal against cold or wet.

Wherever civilised man resides sheep thrive well if properly cared for.

An uneven flock of good sheep is even more valuable than an even flock of poor ones.

Sheep will readily eat stuff that horses or cattle will only consume upon pain of starvation.

Mutton fat and Stockholm tar are excellent softeners or tougheners of a horse's foot, and so also is common castor oil.

As to water for the sheep: provide the very best water that is possible to be had, never allowing them to drink from stagnant pools, which often contain all kinds of disease germs. In fact, when they can possibly do otherwise they will not drink such stuff.

Incubation.

To bring off a successful hatch a hen must be in good flesh and good health when entering upon the period of incubation. Nature has wisely provided for this condition, and it is seldom that a hen not in good flesh and condition shows any inclination to sit. The heat to incubate the eggs must come from the hen's body, and in supplying this heat the surplus fat in the body is burned or consumed. The *Agricultural Gazette* (London) points out that, for this reason a hen should be in good flesh and should be supplied with a sufficient amount of heat and fat forming foods—called carbonaceous foods—to keep her in good condition and keep her temperature at the right point, 103 degs.

Never set a hen in the same room with other hens that are laying, the *Gazette* goes on to advise, but remove her after dark to a separate compartment, which may be partly darkened. A sitting hen likes seclusion. The nest should be previously prepared by first placing a shovelful of soft earth or a piece of sod in the bottom of a box, and on that a layer of fine hay or straw. It should be slightly concave, but not enough to give the eggs much pressure against each other. Do not make the nest in the bottom of a keg or barrel so that the hen will break the eggs by jumping down into the nest. Give her some china eggs and confine her on the nest until the next afternoon, when she can be released and fed. This process should be continued until she returns to the nest of her own accord, when the hatching-eggs can be given her.

Sprinkle some good insect-powder—plenty of it—in the nest, and also give the hen a thorough dusting once a week. Be sure that there are no lice upon the hen or in the nest. Keep whole corn, wheat, grit and water so that she can eat and drink whenever she wants to; also keep a dust-box where the sun will shine into it, and the hen will get a dust-bath and sun-bath at the same time, both of which are beneficial.

Should any eggs become broken in the nest, befouling the others, the balance should be removed, carefully washed in lukewarm water, and replaced in the nest.

It is a mooted question whether or not applied moisture is necessary when the eggs are hatched under hens. This depends upon circumstances. If a sitting hen is closely confined for three weeks it would seem that moisture should be supplied; but if she is allowed to come and go at her will it is different. She will get out in the morning when the dew is on the grass and will gather enough moisture on her feathers to supply what is needed. A hen will sometimes bring off a good hatch in a dry haymow, but by running through damp grass she collects moisture and carries it to the nest on her feathers.

Water for Live Stock.

AN abundance of pure water is a vital necessity on every farm. Stagnant or contaminated water is unfit as drink for either man or beast. Wherever live stock are raised plenty of fresh, clean water should be constantly accessible. It is indispensable. Water that comes from the undefiled depths of the earth is the best and cheapest. Bad water is the cause of many ills of cattle, horses, sheep and pigs. Water is as essential as air to the maintenance of animal life. Good water in never-failing abundance is a practical safeguard of health in farm stock.

“Wasters” in the Poultry Run.

NECESSITY OF WEEDING.

IF poultry-keeping is to be carried on on an economical basis, it is essential that every bird, as soon as it ceases to be productive, be eliminated from the flock, and this means that at all times the work of weeding needs attention.

The term weeding, however, is generally applied to the annual operation of sorting out all wasters from among the growing stock, which is a necessary operation in the yard of every poultry breeder when the birds arrive at an age when their worth and quality can be discerned with certainty.

Weeding needs to be executed with vigour; but there is need of experience and mature judgment if the work is to be wisely performed.

A novice, unaided, may easily weed out some of his best birds, and never should he attempt the work of weeding without advice from one who is a practised hand.

To retain birds that are of no value beyond killing is bad policy for more reasons than one. Not only is the cost of food they consume a source of leakage, but they stand in the way of the progress of the better birds by the room they occupy and by fouling the ground.

They may possibly bully some of the best birds, and check them in their growth, which is a serious matter.

Let the poultry-keeper always be on the lookout for any bird that it is undesirable to retain, and dispose of it immediately.

The exercise of greater care in this matter of weeding would make a great difference to the work of many who fail to realise its importance, and consequently neglect it.—J. A. H., in *Farm, Field and Fireside*.

Capons.

THE flesh of the capon is regarded by epicures as superior to that of chickens, or even the turkey (says *The Rural Californian*). At present capons are most generally known and appreciated in France, but in recent years they have grown rapidly in popularity in the United States, especially in the East. Consequently the business of producing them has advanced rapidly in this country.

A capon, which is a castrated male chicken, bears the same relation to a cockerel that a steer does to a bull. As a result of his more peaceful disposition he continues to grow and his body develops more uniformity and to a somewhat greater size than is the case with a cockerel of the same age.

Coupled with the better growth is the fact that a capon brings a better price per pound. While a rooster ten months to a year old is worth 6 to 10 cents a pound, and in the case of especially fine poultry 12 to 15 cents a pound, capons in season bring 18 to 25 cents a pound.



No matter what time of the year it is, too much cannot be said in favour of cleanliness in the dairy. Many persons think that because summer has come and the cows do not sleep in the filthy lot, it is not necessary to wash the udder before each milking. That is a mistaken idea.

Coal and Labour Return.

Return of Coal raised and Labour employed at the Natal Collieries for the month of August, 1909 :—

COLLIERY.	Average Labour Employed.				Output. Tons. Cwt..	
	Productive Work.			Unproductive Work.*		
	Above Ground.	Below Ground.	Total.			
Natal Navigation ..	338	635	1,023	20	1 043	27,006 0
Elandslaagte ..	283	669	952	—	961	18,739 12
Durban Navigation ..	217	465	682	—	682	13,171 0
South African ..	127	296	423	52	475	12,004 6
Natal Cambrian ..	202	348	550	8	558	11,858 14
Dundee Coal Co. ..	283	473	756	—	756	11,847 19
St. George's ..	217	412	629	—	629	11,594 0
Glencoe (Natal) ..	173	343	516	38	554	10 318 11
Talana ..	117	397	514	15	529	9,237 12
Newcastle ..	81	388	469	—	469	6,008 5
Hlobane ..	91	248	339	28	367	5,828 10
Natal Steam Coal Co. ..	93	202	295	—	295	5,428 9
Ramsay ..	81	133	214	13	227	3,288 18
Hatting Spruit ..	85	109	194	—	194	2,712 8
West Lennoxton ..	56	92	148	—	148	1,607 6
Ballengeigh ..	58	94	156	22	178	1,211 15
Central ..	21	34	55	—	55	99 18
Burnside ..	23	63	83	143	229	68 0
Dewar's Anthracite ..	5	7	12	—	12	44 0
Makatees Kop ..	4	—	4	—	4	8 0
Vaalbank ..	—	4	4	4	8	5 0
Totals ..	2,605	5,416	8,021	352	8,373	152,187 3
Corresponding month, '08	2,067	4,865	6,922	773	7,695	132,786 16

	Productive Work.			Unproductive Work.	Total, Aug., 1909.	Total, Aug., 1908.
	Above Ground.	Below Ground.	Total.			
Europeans	201	162	363	60	423	363
Natives	921	3,290	4,220	185	4,406	4,406
Indians	1,483	1,955	3,438	107	3,545	2,926

* Cost Charged to Capital Account.

† Includes July return.

Mines Department, Maritzburg, 6th September, 1909.

CHAS. J. GRAY,
Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal bunkered and exported from the Port of Durban for the month of August, 1909 :—

					Tons. Cwt.
Bunker Coal ..	..	..	..	..	60,475 8
Coal Exported ..	..	..	..	..	36,695 12
Total ..					97,171 0

Customs House, Port Natal,
1st September, 1909.

GEO. MAYSTON,
Collector of Customs..

Meteorological Returns.

Meteorological Observations taken at Govt. Stations for Month of August, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.).				RAINFALL (IN INCHES).					
	Means for Month.		Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heavy's train-fall in 1 day.		Total for Year from July 1st, 1909.	Total for same per'd from July 1st, 1908.
	Maximum	Minimum					Fall.	Day.		
Observatory ..	76.3	56.4	99.9	56.4	11	7	.06	17th	1.92	2.20
Stanger ..	80.0	55.2	100	48	70	7	.44	17th	2.01	1.55
Verulam ..	80.9	52.3	102	45	15	3	.15	18th	1.76	1.82
Greytown ..	75.3	41.5	87	25	72	2	.37	17th	1.45	1.02
Newcastle ..	76.5	33.2	87	21	85	1	.85	17th	1.65	1.64
Umbogintwini ..	78.8	50.4	103	43	15	2	.12	31st	2.13	—
Estcourt ..	75.4	37.4	94	28	63	3	.32	13.h	.97	.66
Mid-Illovo ..	77.5	51.4	97	39	10	2	.69	17th	1.22	1.33
Ixopo ..	—	—	—	—	23	5	.07	12th	.95	1.06
Imbizana ..	77.6	51.7	86	46	Nil	2	—	—	1.17	1.72
Port Shepstone ..	79.7	52.9	85	47	Nil	—	—	—	1.20	2.08
Umtzinto ..	87.0	54.5	98	51	Nil	—	—	—	1.39	1.11
Richmond ..	77.3	48.1	94	32	28	4	.16	12th	.99	2.10
Maritzburg ..	79.3	44.4	94	31	.08	2	.08	12th	.90	1.04
Howick ..	74.8	40.9	89	27	14	1	.14	12th	.76	1.36
Ladysmith ..	79.5	42.1	90	31	1.21	4	.87	17th	1.77	—
Dundee ..	73.1	47.1	84	35	1.65	1	1.65	18th	2.69	1.54
Weenen Gaol ..	80.3	40.4	92	28	1.13	4	.50	12th	1.49	.90
Cam. erdown ..	80.4	48.2	99	39	24	2	.23	17th	1.04	1.13
Krantzkop ..	79.6	43.7	85	35	1.52	5	1.09	17th	1.52	1.04
New Hanover ..	76.0	43.0	95	29	30	3	.15	12&17	1.08	1.19
Lidgerton ..	76.5	37.3	90	20	17	1	.17	12th	.71	1.33
Utrecht ..	82.0	22.5	91	17	1.35	1	1.35	17th	2.46	—
Nongoma ..	73.7	47.4	88	37	1.59	3	1.10	18th	1.90	—
Ngoni Forest ..	71.8	49.4	86	36	1.51	7	1.06	17th	2.57	—
V. yheul ..	66.2	46.0	76	32	1.47	3	1.24	18th	2.21	2.70
Mtunzini ..	82.2	55.5	95	50	1.70	3	1.20	17th	6.66	4.06
Hlabisa ..	79.2	56.9	84	47	.89	2	.53	17th	1.13	1.55
M. Imoth ..	—	—	—	—	1.31	3	1.07	18th	1.31	1.11
Ubombo ..	71.5	54.4	85	44	1.90	2	1.37	18th	1.95	2.36
Point ..	—	—	—	—	.16	5	.07	17th	2.78	2.48
Krantzkloof ..	76.5	57.6	94	43	.16	4	.09	3rd	1.23	1.72
Nottingham Rd. ..	70.0	30.2	85	19	23	2	.20	15th	.69	—
Mahlabatini ..	82.4	46.4	91	34	1.08	1	1.08	17th	1.45	.98
Em. angeni ..	79.6	54.8	93	44	.96	5	0.70	17th	4.22	3.68

Meteorological Observations taken at Private Stations for Month of August, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.)		RAINFALL (IN INCHES).					
	Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain-fall in 1 day.		T. tal for Year from 1st July, 1909.	Total for same per'od from July 1st, 1908.
					Fall.	Day.		
Adamshurst ..	93	30	0.14	3	0.10	12th	0.79	0.51
Hilton ..	89	31	0.20	3	0.10	17th	0.97	1.12
P.M.B., Botanical Gardens ..	—	—	0.07	1	0.07	12th	0.85	1.26
Ottawa ..	—	—	1.12	2	0.12	18.h	1.78	—
Equneeza ..	—	—	0.04	2	0.02	12 & 31	0.97	1.38
Umlangeni ..	—	—	0.80	1	0.80	2nd	1.68	1.73
Winkel Spruit ..	102	47	0.06	1	0.06	17th	0.23	1.68
Weenen ..	87	33	1.06	3	0.56	17th	1.33	0.38
Giant's Castle ..	82	27	0.40	4	0.40	12th	1.08	1.92

Return of Farms at Present under Licence for Lungsickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Crow	Ladysmith	Scab	E. Moreland	Reit Kuil
		"	Mrs. M. J. v d Merwe	Coolfontein
		"	Natives	Roosboom
		"	Natives	aurie's Kraal
		"	H. Raath	Puttini Spruit
		"	T. J. M. Buys	Reuit Kuil
		"	A. W. Illing	Flagstaff Spruit
		"	Natives	Goedgedacht
		"	Mrs. Spring	Ke-er-e
		"	A. G. Dannhauser	Riet Kuil
		"	J. C. Buys	"
		"	Natives	Blew Bank
		"	Natives	Phoyhaai
		"	J. Farquhar	Stewart Park
		"	J. Hyde	Hydeswood
		"	Natives	Kleinfontein
		"	Natives	Rooipoort
		"	Sparks Bros.	Brimley
		"	Harvey	"
		"	H. J. Buys	Piets Hoek
		"	L. J. J. E. Bester	Pootena's Spruit
		"	B. J. Nieuabar	Tylden
		"	P. Bartlett	Uithol
A. B. Koe	Portion of Estcourt	"	R. A. Smith	Lombard's Kop
		"	G. B. Jone	Bergveldt
		"	Schlanders Bros.	Kelvin
		"	J. C. Potgieter	Potgieter's Drift
A. C. Williams	Utrecht	"	J. G. Hatting	Ranna
		"	R. Mattison	Calcott
		"	J. W. Moor	Greenfield
		"	Umlumbo	Twyfelfontein
		"	Umtellen	"
		"	Natives	Groot Vlei
		"	Mrs. R. P. Pies	Goede Hoop
		"	Natives	Ouweracht
		"	Natives	Sanspruit
		"	Toi Nel	Weihhoek
		"	J. van Schalkwijk	Weitevreden
		"	M. L. Dendorff	Waterval
		"	A. T. de Jager	Eenkanthango
		"	J. F. Meyer	Rooie Zand
		"	T. Bezuidenhout	Vogelkrantz
		"	Natives	Benaauw
		"	Natives	Goedeloop
		"	P. L. Uys	Town Lands
		"	T. de Jager	Tigerkrantz
		"	Natives	Riet Vlei
		"	D. Hartman	Roekop
		"	J. de Winnaar	"
		"	C. Potgieter	Nitkomst
H. Van Rooyen	Babanango	"	P. Truter	Welgevonden
		"	— Lekhoff	Bale Spruit
		"	Y. Hambridge	Strydfontein
		"	Natives	Vergenoeg
		"	G. van Ensberg	Politië
		"	Natives	Tamboekieshoek
		"	"	Frieschgewaagd
		"	J. B. Davel	Kilfontein
		"	J. P. Moolman	Mooihoek
		"	J. L. Nel	Tamboekieshoek
		"	N. Fourie	Lantruwacht
		"	L. Tante	Waterhoek
L. Trenor	Alfred	"	C. van Tonder	"
		"	P. Landman and G. Bezuidenhout	"
		"	K. Conje	Verb. kop
		"	P. L. Uys	Waaiboek
		"	Natives	Eersteling
		"	Natives	Paardeplaat
		"	Natives	Swartfontein
		"	Natives	Welverdiend
		"	Natives	Uitkyk
		"	Natives	Verduveld
		"	Yalwayo	Location

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWN. R.	FARM.
L. Trenor	Alfred	Scab	Natives	Wellust
		Lungsickness	J. T. Clothier	Bentliff
			C. Knox	Whitchiff
			Sigum	Knaywood
			Mqunansla	Lot F
			Spingaan	Omega
		Scab	Incabi	Hawarden
			Makerlu	Location
			Natives	Location No. 1
J. R. Iffe	Lion's River	Lungsickness	G. Hogg	Lorna Doone
		cab	Smith & Braithwaite	Loskop
			Arbuthnot, O. C.	Gowrie
			G. M. Trickett	Lewick Commonage
C. T. Vaughan	Paulpietersburg		P. Allen	Welverdiend
			P. Marais	Maketeeskop
			C. C. mbrink	Pivaan
			D. van Collier	Schuruberghoek
			C. P. Botma	
K. Ripley	Intonjaneni		Nkanyezi	Groenkop
			T. W. Smith	Oakdale
			S. Ferriera	Diepkloof
			Natives	
C. T. Vaughan	Paulpietersburg		Natives	Schuruberghoek
			A. J. Kriel	Vaalkop
			G. P. Slabbe	Paardefontein
			H. E. Ries	Welgelegen
			N. J. Els	Viljoen's Rest
			Natives	Town Lands
			R. Craig	Freschwaagd
			J. B. Rudolph	Boschkraantz
			J. M. van Rooyen	Halburton
			C. Viljoen	Paapkwil Vlei
			C. Webb	Paardefontein
			J. H. Stadler	Paardefontein
			Mrs. Stadler	Paardefontein
			H. Viljoen	Rooiekopje
R. Wingfield Stratford	Newcastle		Natives	Stalkrantz
			F. R. Muller	Leyden
			J. S. Watson	Bismarek
			M. C. Adendorff	Sandford
			Natives	Chevishek
			J. Dixon	Blauwbosch
			Angus Wood	Harte Rivier
			M. J. Oosthuizen	Enden Vlei
			T. Lazenby	Springbok
			D. Degenaar	Balliguch
			C. Kennedy	Tennyson
			Natives	Dassiepoort
			Natives	Connigsberg
			Schwikkard & Co.	B. scobello
			Natives	Koppie Alleen
			E. J. Dicks	Essenwood
C. E. Walker	Portion of Estcourt		A. M. Muller	Droogdal
			Oates, W. E.	Oatsdale
			A. Stuart	Glen Stuart
			Natives	
			J. McFie	Lowlands & Stocklds
			H. T. K. Miller	Beacon Hill
			A. Carter	Glendooene
			F. H. Kerr	Rock Mount
			L. Lloyd	Hidcote
			J. W. Haw	Woodleigh
			J. Marais Jun.	Northcote
G. Daniell	Vryheid		Johnson & Clarke	Bergonis
			Manqulu	Hardtetaald
			Mkelegana	
			Kuyeze	Mooiplaat
			Mrs B. Webbe	Rustenburg
			C. Beneke	Langkrans
			M. v d Westhuizen	Vaalkopje
			Natives	Cranstoot
				Frado
				Zandfontein
				Kandaspruit
				Alpha
			J. J. Odendaal	Uitkomst
			J. T. Groening	Hartebeestelaagte
			H. D. F. Rabe	Langkrans

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
G. Daniels	Vryheid	cub	J. J. de Jaer	Vredehof
			J. A. Viljoen	Stillwater
			E. Combrink	Bankroset
			P. J. Swarts	Aloeboom
			J. M. Kockemoor	Scheeperslaagte
			Natives	Schurlohoek
			J. Birkenstock	Vergelegen
			S. Labuschagne	Aloeboom
			J. N. Swart	
			C. S. van Rooyen	Bloenderdal
			D. Swarts	Aloeboom
			Micah	Groenkop
			C. van der Merwe	Nooitgedacht
			C. van Rooyen	Bloenderdal
			P. Tredoux	Weinansrest
			J. H. Lombard	Driefontein
			H. A. Lombard	
			A. W. Meyer	Kromellurboorg
			G. H. van Rooyen	Vresgewacht
			W. F. van Rooyen	Bloemendal
			A. Jansen	Frauintzicht
			J. H. Combrink	Goedhoop
			Natives	Goedgedacht
			J. G. Theron	Traktaal
			J. F. Potgieter	Vaalsloot
			M. Kungmann	Vredehof
			Natives	Vaalkrans
			J. J. Gregory	Weltervreden
			J. J. Nel	Baufort
			A. Armstrong	Lekkerwater
			H. Beukeus	Sterkstroom
			J. Z. Moolman	Klipfontein
			F. D. Moolman	
			G. van der Wenter	Tintasdrift
J. R. Cooper	Nkandha & Ngutu		Natives	Selutshana
			"	Ngutu
			"	Telezi
			"	Tshutshosini
			"	Hlazagazo
			"	Masodgeni
			"	Blood River
			J. G. du Preez	Nondweni
			Natives	Mbilane
			"	Huladu
			"	Emgezini
			C. E. Parr	Sandhlwana
			H. Muller	Ngutu
			Natives	Ncenceni
			"	Mapaswaneni
			"	Mkonjana
			"	Vants Drift
			"	Nondweni
E. Varty	Western Unvoti		"	Mafethling
			"	Hlozagazi
			"	Dalale
			"	Magala
			"	Nqdeni
			"	Gadaleneni
J. F. van Rensburg	Ngotshe		"	Maweni
			"	Mafethleni
			D. C. S. Nel	Highfield
			J. G. Nel	Elladale
			J. A. Graham	Driefontein
			H. Hansmeyer	Onres
J. Stewart	Bergville		J. C. Emmett	Goudhoek
			A. M. Potgieter	Good Hope
			B. C. Hatting	Avonduur
			Natives	Tochygeisnde
			J. D. Bester	Smaldeel
			L. Botha	Weltervreden
E. W. Lark	Umsinga		J. Joubert	Kondelaager
			J. Caskie	Warhoop
			J. H. de Jager	Tulinchesnall
			J. W. Scheepers	The Steps
			H. Jackson	Lytton
			Reed Bros.	Klaarfontein
			G. E. Tatham	Nertherley
			Oyugnlangans	Umsinga
			Tshantulu	Umsinga

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
E. W. Larkan	Umsinga	Scab	Susezulu	Umsinga
			Natives	Location
			"	Gordon Memorial
			"	Vaalkop
			T. H. Dedekind	Harding
			A. Muller	Sutherland
			W. W. Strydom	Oranje
			Natives	Cr.iguilliar
			"	Klippoort
			"	Umsinga
R. Mayne	Eastern Umvoti & Krantzkop	"	V. L. Whelar	Martens
			Natives	Uithoek
			Natives	Urleigh
			J. P. C. Nel	Spitzkop
			W. Turpin	Ohvefontein
			J. C. Nel	Spitzkop
			Natives	Enatlabolo
			P. and H. Mare	Speculation
			W. Havemann	Sophiadale
			J. T. Martens	Groenkop
E. W. Bowles	Ixopo	"	J. M. Zietsman	Paul's Rest
			Natives	"
			L. G. Nel	Glenboig
			Van Rooyen Bros.	Wonderfontein
			Bogwan	Arundel
			Nduba	Waverley
			Makafana	"
			Gungatshi	Location No. 3
			G. H. Cooper	Avetary
			D. E. Hardman	Ellington
E. W. Bowles	Ixopo	"	Mandemba	Lot D.U.
			Tebenga	"
			E. F. Garland	Springvale
			E. W. Veley	Aythorpe
			Gangadene	Coolhill
			Tshelwana	A of S 55
			Solabaumba	Gorton
			Godhloza	"
			Bobejana	Lot K of 5
			Bopeni	Smithfield
A. H. Ball	Weenen..	"	G. Smith	Smithfield
			J. P. Lotter	Berg Vleit
			P. H. Van Rooyen	Buffels Hoek
			P. P. van Rooyen	Doornkloof
			Naude & Lotter	Scottshoek
			J. T. van Rooyen	Belle Vue
			Natives	Acellia
			J. R. van Rensburg	Blinkwater
			J. S. Els	Stottsburg
			E. C. Robinson	Mona
A. F. Smith (acting)	City, Umgeni	"	S. C. van Rooyen	Middelburg
			C. P. F. Lotter	Waterfall
			Vander Westhuysen	Winterhoek
			R. J. J. van Rooyen, Sr	Bird'spruit
			L. J. Fourie	Scotts poort
			P. R. Buys	Waterfall
			P. H. van Rooyen	Buffel's Hoek
			T. C. Lotter	Waterfall
			Uweli	Zwaartkop Location
			Dria	"
A. J. Marshall	Dundee	"	Samuel	"
			Jan je	"
			Laduma	"
			E. Taylor	Taylor's Station
			Ramen	Ellis' Estate
			J. Henwood	Hilton Road
			B. J. Bidenhorst	Kem enveldt
			H. A. J. Davel	Kliprug
			C. T. Vermaak	Kalderfontein
			Natives	Con erf
A. J. Marshall	Dundee	"	"	Ruigtefontein
			McKenzie & Kruger	Dabray
			Natives	Klipport
			G. Lidgett	Northfield
			Natives	Waschbank
			Geo. Kremer	Dalry
			Natives	Beggersgat
			R. J. Marshall	Cleveland
			J. de Jager	Waschbank
			"	"

RETURN OF FARMS UNDER LICENCE (*Continued*),

STOCK INSPECTORS.	DISTRICT.	DISEASE.	OWNER.	FARM.
		Scab	Natives ..	Blinkwater
		"	" ..	Hartebeestfontein
		"	" ..	Doonside
		"	J. Hatting ..	Limestone
		"	G. R. van Rooyen ..	Singletree
		"	Natives ..	Goedekens
		"	" ..	East Hesterton
		"	C. M. Meyer, Sen. ..	Gladstone
		"	R. J. Marshall ..	Woodlands
A. J. Marshall ..	Dundee ..	"	J. B. Wade ..	Stanton
		"	C. J. P. Landman ..	Iro-dale
		"	Natives ..	Kamelboom Kop
		"	G. F. Dannhauser ..	Cardwell
		"	H. A. J. Duvel ..	Klipry
		"	J. H. Hatting & Son ..	Hattingdale
B. Klusener ..	Lower Umzimkulu	Lung sickness	Nyapu ..	Berbeck
E. J. B. Hosking ..	Upper Unkomanzi	Scab	A. Nicholson ..	Roselands

Pound Notices.

NOTIFICATION is contained in the *Government Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :

ON THE 20TH OCTOBER.

Acton Homes, Bergville—Two black hogs, both lame in the right back leg.

Howick—Impounded on the 5th September by J. J. Day, farm "Singletree": Dark brown stallion, star on forehead, about 13.2, rising 3 years, no brands. Probable value, £10.

Loteni, Impendhle—White boar pig.

Nqutu—Cream gelding, about 14 hands, aged, no brands, very poor condition.

Vergelegen, Vryheid—Two black Kafir sheep, ewes; bastard Kafir sheep, ewe; Different native ear marks.

Vryheid—Merino hamel, right ear two nicks and slit, no brands. Impounded by Sobanto on the farm "Vleiplaats."

Notice.

OWING to the increasing demands upon our space, we have arranged to publish *quarterly* instead of monthly as hitherto certain standing reference matter. This matter will consist of (1) Scale of Charges for Vaccines, etc., at the Government Laboratory; (2) List of East Coast Fever Advisory Committees; (3) List of Executives of Farmers' Associations; and (4) List of Publications issued by the Department of Agriculture. In future readers will find this matter in the January, April, July and October issues of the *Journal*.

Government Cold Stores and Abattoirs.**PIETERMARITZBURG.**

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

	Calves up to One Year old.	Cattle over One Year old.	For minimum number of 250 head per month.		For maximum number of 500 head per month.	
			Under 300 lbs. weight.	Over 300 lbs. weight.	Under 300 lbs. weight.	Over 300 lbs. weight.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1. Receiving per head	0 3	0 6	0 6	0 6	0 3	0 3
2. Killing and Cleaning "	2 3	3 6	2 9	3 3	2 6	3 0
3. Labour "	0 3	0 6	0 3	0 6	0 3	0 6
4. Disinfectants "	0 1	0 1	0 1	0 1	0 1	0 1
5. Bagging (4 Quarters) per body	1 9	3 0	2 6	2 9	2 3	2 6
6. Cleaning of Tripes each	0 6	0 6	0 6	0 6	0 6	0 6
7. Chilling of Beef, up to 72 hours or portion thereof per body	1 0	2 9	2 0	2 6	1 9	2 6
8. Chilling of Offal, up to 72 hours or portion thereof per set	1 0	1 0	1 0	1 0	1 0	1 0
Chilling and Freezing Beef—						
9. 1st week or portion thereof per body	2 0	4 6	3 9	4 0	3 6	3 9
10. 2nd " " " " "	1 0	4 0	3 3	3 6	3 3	3 3
11. 3rd and remaining weeks or portions thereof "	0 8	3 0	3 0	3 0	3 0	3 0
Chilling and Freezing Offal—						
12. 1st week or portion thereof per set	1 4	1 6	1 4	1 4	1 4	1 4
13. 2nd " " " " "	1 0	1 3	1 0	1 0	1 0	1 0
14. 3rd and remaining weeks or portions thereof "	0 9	1 0	0 9	0 9	0 9	0 9

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg,
21st December, 1908.

Farm Apprentices' Bureau.

LIST OF APPLICANTS.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | |
|--------|---------|--|
| No. 2. | Age 15. | Has had 18 months' experience of farming. Understands more about forestry than general farming. Speaks Zulu, and understands Dutch. |
| „ 3. | Age 24. | Colonial born. Has a knowledge of bookkeeping. |
| „ 4. | Age 18. | Natal born. Anxious to learn farming. |
| „ 6. | Age 17. | Still at school. Speaks French fluently, and has a fair knowledge of German and Dutch. Is very well educated. Particularly anxious to learn farming. |
| „ 11. | Age 18. | Has had two years' experience on a sheep farm in the O.R. Colony. Is particularly anxious to get back on a farm. Is very willing and obedient. |
| „ 13. | Age 20. | Is an orphan. Is anxious to learn farming. |
| „ 14. | Age 16. | Natal born. |
| „ 15. | Age 19. | Is desirous of learning farming. |
| „ 17. | Age 20. | Speaks Zulu. Is keenly interested in farming. |
| „ 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. |
| „ 26. | Age 18. | Has a knowledge of Zulu. Was brought up in a farming district in Scotland. |
| „ 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. |
| „ 30. | Age 18. | Transvaal born. Has had experience on a mixed farm. Speaks Dutch and Zulu. |
| „ 31. | Age 20. | Has a knowledge of engineering and carpentry. Is a Natalian. Anxious to learn. |
| „ 34. | Age 18. | Has a slight knowledge of Zulu. Understands carpentry. |
| „ 35. | Age 21. | Has had five years' experience on farms. Understands cattle and horses and Agriculture. Is anxious to get back on a farm. |
| „ 38. | Age 21. | Has had twelve months' experience of farm life. Speaks Zulu. Is educated. Has a knowledge of joinery, carpentry, brick-laying, and bookkeeping. Abstainer, and has a good character. |
| „ 39. | Age 19. | Has had twelve months' experience on a fruit farm in the Cape Colony. Speaks Dutch. |
| „ 40. | Age 24. | Has had a little experience of farm life. Understands bee-keeping. Is anxious to get on a farm. |

Cheese sold off the farm is expensive in its use of fertility. Feeding the skim-milk is a better policy.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 115.—Englishman, 26 years of age, steady and an abstainer, with a knowledge of cattle and horses, wishes employment on a farm in Natal (English preferred) as a handy man, with a view to furthering his knowledge of farming in this country. Is willing to accept food and clothing in a good home, for services, for a few months with the prospect of a small wage after the first three months.

No. 116.—Cape man, age 32 years; married, no children. Has been used to working with horses and mules all his life. Has good papers from his previous employers, and was in the employ of the Public Works Department for over five years. Is willing to do anything in his power, but cannot read nor write.

No. 117.—Englishman, 25, of good education, desires appointment as overseer on a plantation in Natal, and would pay a reasonable premium and give services free for a few months if necessary. Has had commercial, engineering, surveying and mining experience.

No. 118.—Pensioner from the Army desires to obtain post on a farm. Is particularly fond of gardening. Has excellent discharge papers and good testimonials.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 121.—Desires open air employment. Age 43. Life experience of agricultural pedigree and prize stock gained in Scotland. Has been six years in South Africa. First-class references and testimonials. Small salary required.

No. 122.—A young man, with life-long experience of cane-growing, desires employment as manager or overseer on a plantation. Experience has been in Queensland and Fiji. Is good at figures and capable of taking charge of books if necessary.

No. 123.—Married man, 35 years of age, with 5 years' experience on poultry and stock farm in California, wishes to get on to a farm in Natal. His wife is a good cook and handy in dairy. Would be willing to work for a very small wage or for their keep or a period of twelve months at least, after which they would expect some remuneration. Can produce first class personal references.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

FEES FOR AGRICULTURAL ANALYSIS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

POULTRY.

Orders will be received for eggs for sitting of the following breeds for immediate delivery:—Buff Orpingtons, White Leghorns, Silver Wyandottes and Plymouth Rocks,

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible:—

Admittance of Students to the School of Agriculture.—House Master, Cedara.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.

Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.

Agricultural Seeds, etc., for Irrigation Farming.—Curator, Government Station, Weenen.

Fruit.—Orchardist, Cedara.

Accounting Business.—Accounting Clerk, Cedara.

Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.

Apiculture.—Apiarist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry,
Cedara.

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

NATAL GOVERNMENT RAILWAYS.

REDUCTION IN LOCAL GOODS RATES.

WITH effect from 1st September, 1909, the following alterations are made in the Rates on local goods traffic between N.G.R. Stations :—

- (a) The rates on short distance Traffic are reduced.
 (b) The Normal, Intermediate "B" and Rough Class rates are reduced by approximately 10 per cent.
 (c) The Imported Produce Class is assimilated with the Rough Class.
 (d) The rates on Fencing material are substantially reduced.
 (e) The following commodities are reclassified :—

	Class from.	Class to.
S.A. Acorns, Almonds, Bone and Bone Manure, small lots; Boxwood and Charcoal, smaller lots than truck loads; Fanko in bulk; Fat for manufacturing purposes; Fencing Posts, small lots; Firebricks, small lots; Firewood, small lots, securely packed in bags; Fowl Food; Gypsum; Locusts, dried; Manure, small lots; Meal; Mine Props, small lots; Molassine and Molascuit Meal; Nuts, food-stuffs; Oil Cakes; Poles, bamboo, gum, mangrove, etc.; Raisins; Salt for cattle feeding, small lots; Samp; Semolina in bulk; Soap for wool washing purposes; Shooks; Sugar Cane, Cane Tops, and Cane plants in small lots; Tallow; Treacle in drums or casks; Wood ash, small lots	6 "B"	6 "C"
S.A. Wattle Bark in bundles	6 "B"	6 "C"
		+ 10 p.c.
S.A. Charcoal, in full truck loads, chargeable on marked weight carrying capacity of truck used	6 "B"	11
S.A. Dakka	6 "A"	1
S.A. Packing Boxes; Oil	6 "A"	4
Imported Aloes; Acorns; Hops; Oil, cocoanut, palm and palm kernel; Resin; Saddle Trees; Sunflower Seeds; Tin, bar, block, or ingot; Zinc Discs, ingots or sheets	2	3
Agricultural and Dairy Implements and Machinery; Cork Dust; Lead, pig and sheet; Oil Cakes for cattle feeding, imported; Trees, imported; Whiting; Wood meal and pulp	2	4
Baths, galvanised iron, undamageable; Biscuits; Coffee Mills; Galvanised Flower Pots; Glue; Haircloth; Hemp; Lawn Mowers; Nestle's Food; Potash; Pumps, e.o.h.p., undamageable; Sugar Candy	1	2
Sawdust	8	4
Fowl Food, imported	8	2
S.A. Wagon Wood, Rough	8	6 "C"
S.A. Sugar Cane, for fodder; cane tops; and cane plants. In full truck loads charged on the marked weight carrying capacity of truck used	—	No. 11
S.A. Rough Timber in its natural state. In full truck loads charged on the marked weight carrying capacity of truck used	8	No. 11
Apothecaryware: Bath Chairs (when not packed or packed in canvas not conveyed by goods train); Billiard Tables and Fittings; Chromos; Clocks (Insurance); Cycles (packed); Drugs and Druggists' Sundries; Electro-plate (Insurance); Engravings (Insurance); Instruments of all kinds (Insurance); Ivory (Insurance); Karosses; Lace (Insurance); Millinery (Insurance); Motor Cycles; Paintings (Insurance); Perfumery; Photographic sundries and material; Pianos (Insurance); Plated ware (Insurance); Quicksilver; Satin (Insurance); Silks (Insurance); Silverware (Insurance); Trinkets (Insurance); Watches, other than gold and silver (Insurance); Works of Art (Insurance)	1	1
		+ 25 p.c.

A pamphlet setting forth details of the revised rates will be issued about the 27th instant.

General Manager's Office, Maritzburg,
20th August, 1909.

J. W. SHORES,
Acting General Manager.



EPIZOOTIC LYMPHANGITIS.

Showing the appearance of a leg of an animal suffering from this disease.

(An Article on Epizootic Lymphangitis will be found in the present issue of the Journal.)

The Natal Agricultural Journal.

The Colony's Need.

THE publication of the Bill "to amend and extend the Agricultural Development Act No 44, 1904," which it is the intention of the Government to introduce during the present Session of Parliament, foreshadows an important step in the agricultural development of Natal. Further than that, it marks a turning-point in the economic history of the Colony.

It might, perhaps, with much truth be said that the progress of farming is measurable by the increasing intensiveness of land settlement. Certain it is that the wealth of a new country under normal circumstances and without taking into consideration the mineral resources of the country, is dependent for its increase upon the increasing settlement of the land, since every fresh settler is a fresh wealth-producer who, by his industry, renders available the latent wealth of the soil. The soil is the capital of a new country; the crops it produces are the interest on that capital. Every man of business seeks to realise the greatest possible amount of interest on his invested capital; and in the same way the State realises to the greatest possible amount of interest must be got out of its land. We have the land, and we must use it to the greatest advantage: for every fresh acre brought under cultivation, by increasing the spending or investing powers of the farmer, and lessening the amount of money sent oversea for foreign supplies, benefits the whole community, and that benefit is increased as more land comes under the plough or is made to carry live stock and as more wealth consequently becomes available for circulation.

It was a realisation of these facts that prompted the framing by

the Government when Mr. Clayton held the portfolio of Agriculture, and the passing by Parliament, of the Natal Agricultural Development Act of 1904, and that brought about the constitution of the Land Board for the purpose of promoting the settlement of the land. The Bill as it was originally framed by Mr. Clayton, however, differed in a most important respect from the Act which finally obtained the sanction of Parliament and became law. The original Bill sought, among other things, to give the Government powers of land expropriation, in respect of unbeneficially-occupied areas, but this was an innovation which, in the eyes of Parliament, amounted almost to a usurpation of individual rights to a restriction of the freedom of the individual, and the section of the Bill which would have conferred these rights on the Government was expunged.

Since then five years have passed, and with the limited resources of land at its disposal, the Land Board, backed by the Government, has worked strenuously to secure the settlement of some of our unoccupied areas, and its efforts have been attended with results of which the Board and the Colony may justly be proud. But the amount of suitable land at the disposal of the Government has steadily diminished, and the position now is that, unless more land be forthcoming, the closer settlement of the country will yearly be attended with greater and greater difficulties, with the probable result, at a no very distant period, of the practical cessation of rural immigration to this country.

The close settlement of the land has in the past been regarded as an ideal impossible of attainment. There was a time in South Africa when it was generally considered that no farmer could possibly keep himself and his family comfortably on less than 4,000 acres of land. This extravagant idea is still held by many, but obviously it is an idea that is chiefly the natural result of an ignorance of anything but the most primitive methods of farming, whether stock or agricultural. Undoubtedly, at the same time, as it must be admitted, there are farms of 4,000 acres or more in this country that could not safely be sub-divided and yield a comfortable living to more than one family, on account of their distance from the railway, the unsuitability of their climate and soil for the growing of the staple farm crops of this country, and various other considerations which militate against the securing of as large a cash return per acre as other farms more happily circumstanced. Proximity to a railway and the existence of tolerable roads constitute the chief factor that governs the yielding capacity of land from a monetary point of view. In other words, the margin of profit on the produce of any given area of land, whether that produce be of an agricultural or of an animal nature, is governed by the cost of transportation to the nearest railway station and by the distance of that land from the chief market; and the close settlement of such land is dependent for the

degree to which it can be carried out upon the annual profit per acre thus yielded by the land. The measure of the annual profit per acre is, however, not entirely dependent upon these considerations. The chief aim of science applied to the operations of farming is to increase the output of every acre utilised. By judicious manuring and by the adoption of correct methods of tillage the yield per acre of the crop grown is increased; by the use of the best machinery money is saved in labour and gained in the increased efficiency of the work performed; by the substitution of more nutritious pastures for the less valuable native grass of our veld a larger number of stock can be kept on a given area and they will yield greater gains in meat and milk; by the provision of fodder for use in the winter the acreage required for the maintenance of stock during that dry period is very sensibly diminished; and by careful observance generally of economical methods throughout the farm the cost of farming is reduced and the average monetary return on each acre is increased.

From these considerations, it is evident that with the efflux of time the settlement of the land must tend to become possible on increasingly intensive lines: as the country is opened up and its various parts are brought into closer touch with each other and with the markets by means of railways, as roads are constructed and old and difficult ones are put into better condition for the purposes of heavy transport, and as the awakening of the farmers to the benefits which science has to offer to the receptive farmer takes place, so the money-yielding capacity of the land is gradually increased, hand in hand with its close-settlement value. This applies as a general principle to most lands, but we have, as we have said, to except lands inaccessibly situated as regards railways or even roads of a nature suitable for heavy transport and unfavourably placed as regards considerations of climate. Such lands perhaps it can never be hoped to see more intensively settled than they are at the present time, but in their aggregate they form but a very small proportion of the total area of relatively intensive farming.

We have just made use of the expression of the words, "*relatively intensive farming*." This brings us to another point which we would not overlook, and which it will be convenient to refer to at the present juncture. We refer to the fact that "close settlement" can only be regarded as a relative term. We have shown roughly how the settlement capacity of land increases as time passes, but at the same time we have shown indirectly that this capacity for carrying settlers becomes greater only very gradually, since it is dependent for its growth primarily upon the two factors of increasing marketing facilities and increasing adoption of scientific methods of farming. When close settlement is spoken of, the idea that arises in the minds of many is the intensiveness of rural settlement that is the characteristic of Great Britain and the European

Continental countries. They look at the small average size of the farms in those countries, and, thinking of the returns per acre which even the best and most favourably situated farmers here obtain, they very pertinently ask whether anyone in his senses expects the subdivision of land in this country to the extent of that which is general in Europe to be attended with anything less than the most disastrous consequences to those who have been sufficiently foolhardy to settle, or allowed themselves to be deluded into settling, upon such small holdings. "Close settlement," however, when it is referred to in relation to Natal or South Africa, does not contemplate the subdivision and settlement of land upon such intensive lines as those which prevail in the United Kingdom and on the European Continent. The fact seems to be overlooked that these countries are the home both of scientific agricultural research and of railway communication, besides possessing good roads that are centuries old, and large urban populations that afford a constant market for immense quantities of farm produce. The conditions in Natal in these respects are relatively primitive, and the settlement of the country must be proceeded with upon correspondingly less intensive lines. That the settlement of the land can very well be more intensive than it is at present, however, cannot but be admitted by anyone who surveys the periodical returns published by the South African Customs Statistical Bureau and notes the large imports of produce which might well be raised on our own farms, or who looks oversea and contemplates the large markets that exist for products which are or could be raised in Natal, and who, finally, casts his eyes over the large areas of land in this country which are not even used for the grazing of stock but which are lying idle and slowly rising in value merely through the efforts of industrious farmers in the vicinity and through the gradual opening up of the Colony generally.

Of such land there are very large areas in Natal—uninvested capital lying idle and yielding no interest, and thus contributing nothing to the well-being of the commonwealth: rather, in fact, serving to retard the progress of the country. That there is a demand for land, the recently issued report of the Land Board shows in a very gratifying way, but the report also points out that practically all the Crown lands suitable for the purposes of closer settlement at the present time have been alienated. In view of this state of things, the enactment of a land expropriation law is not only desirable, but, in the interests of the country's prosperity, really essential; and we sincerely trust that before the present Session is over, Parliament will see its way to grant the Government such expropriation powers as will enable it to acquire suitable land on fair terms for the purpose of subdivision and disposal to new settlers.

Such powers are sought in the Bill to which we referred at the

beginning of this article, but whether Members amend the Bill in some of its respects or not, it is to be hoped that the principle of the measure at least will be affirmed and the power of compulsory purchase be conferred upon the Government.

A glance at the main provisions of the Bill introduced by Government will serve to indicate the tenour of the measure.

The Bill provides for the inspection of any rural lands for the purpose of ascertaining whether they are suitable for acquisition or whether and to what extent they are beneficially occupied, and of valuing them. Upon the recommendation of the Land Board the Governor in Council will have the power to acquire such land by purchase or exchange at a price or value not exceeding that recommended by the Board. Failing that, the land may be taken compulsorily, upon certain conditions; and as this question of compulsory acquisition is an important one we may as well quote the second and third sub-sections of Section 7, as well as Section 8, which give the principles upon which the acquisition of land is proposed to be undertaken. The sub-sections in question of Section 7 are as follows:—

(2) Save as is provided in sub-section (3) no land (which is being beneficially occupied) shall be taken compulsorily unless there is left to the occupier his residence and industrial buildings, with so much land as is reasonably required for the purpose of his business, having regard to the condition of his business at the time when it is sought to take the land, nor shall any land be so taken the aggregate extent of which, with any contiguous lands held as one block and beneficially occupied, is less than two hundred acres.

(3) The owner or occupier may in any case require that the whole, and not merely a part of the lands held as one block and beneficially occupied, shall be taken, unless the residue is at least one thousand acres in extent.

Section 8 reads as follows:—

Any owner whose land is compulsorily taken shall be entitled to compensation to be determined according to the provisions of this Act and of the Lands Clauses Consolidation Law No. 16, 1872 which Law shall be incorporated with this Act for any purposes not herein provided for in connection with the compulsory taking of land, and the protection of mortgagees, tenants and others having an interest in the lands taken.

In connection with the former of the two sub-sections quoted above, Section 14 may also relevantly be quoted:—

Where, in connection with the expropriation of land, the question arises how much land is reasonably required for the purposes of the occupier's business, it shall be the duty of the Land Board to determine the same upon enquiry held in the like manner as aforesaid, and the decision of the Board thereon shall be final.

In deciding whether any land is beneficially occupied, the Land Board is to be enjoined to consider (*vide* Section 15) "whether the occupation is such as, having regard to the extent, nature, and situation of the land, and any natural circumstances affecting its use, constitutes

an active and reasonably sufficient utilisation according to civilised methods, for agricultural, pastoral, or industrial purposes or for any lawful purpose of utility or enjoyment." (Note that the last clause guards against the possibility of infringement upon the rights of the individual in the *use or enjoyment* of his property.)

The same section as that from which the foregoing is quoted provides that "land owned by a European shall not be deemed to be beneficially occupied if it is occupied by Natives or Indians."

These are the main provisions of the Bill, embodying the principle of the measure. The *modus operandi* in the acquisition of lands is also defined in the Bill, but considerations of space preclude any reference to it here, nor would an enumeration or discussion of them add anything to our conceptions of the questions of closer settlement and the expropriation of land—which are the two matters which it was our purpose in the present article to discuss. When the Bill has become law, whether in its present or in a modified form, we shall, in accordance with our usual practice, reproduce in the pages of the *Journal* the main provisions of the measure in common with those of the other acts of agricultural legislation which are this Session added to the Colony's Statute Book. For the present we have to confine ourselves to the urging of the need for the bestowal of expropriation powers upon the Government; and accordingly, with the brief elucidation which we have endeavoured to give of the position in which the Colony finds herself at the present time in regard to land settlement, we leave it in the hands of the more thoughtful of our farmers to affirm and in the hands of our Members to legalise by an Act of Parliament the principle of expropriation in respect of unoccupied lands, the adoption of which by the State seems so necessary at the present juncture in the settlement of our country.

With reference to the orders issued by him from time to time prohibiting the removal of cut grass within the Colony, the Minister of Agriculture notifies (Government Notice No. 470, 1909) that the term "cut grass" as used in those orders will not be held to include imported hay or straw used in the packing of goods handed to the Natal Government Railways for conveyance by rail either within the Colony or beyond its borders, provided that the consignment note bears an endorsement by the consignor to the effect that the hay or straw in which the goods are packed is imported, and provided further that the railway official receiving the goods is satisfied that such is the case.



Maize Export.

WE have received from the Port Captain, Durban, the following notes on the export of maize, which will be read with interest. In his covering letter Mr. Rainnie says: "The notes give the situation as it is seen at the Port, but I am not in a position to fix the blame. There are doubtless disabilities which the farmer has to contend with and which should be looked into. In any case every effort should be made to place this product on the high plane its superior quality should command."

The export of maize (the Port Captain writes) is increasing more rapidly than was anticipated, and oversea markets recognise its superior quality. This season's export through Durban to end of September approximates 530,000 bags. Unfortunately, inexperience and perhaps a pardonable want of appreciation of the conditions necessary to safely transport such traffic 6,000 miles oversea are endangering good and stable prices. The difficulties experienced at Durban with this season's crop may be epitomized as follows:—(a) Many consignments of wet maize; (b) consignments which include bags of dry sound maize and bags of wet maize; (c) consignments containing dry and wet maize in the same bag; (d) good consignments with one or more bags of sweepings included; (e) consignments of, say, yellow maize which frequently include a few bags of other qualities, or half the consignment is other than described. Many bags contain white maize at the bottom and yellow maize at the top, and occasionally Kafir corn helps to fill the bags; (f) old and torn bags are still being used by a few senders.

The duty of the Government Grader is simply to certify as he finds, and he cannot transform wet into dry, or bad into good grain. He is required, however, to expose the careless or inexperienced consignor, these people being a danger to the country's prosperity; and farmers' associations should also seriously look into the matter as we have formidable competitors for the world's markets—our mistakes being, of course, their

gain. During the present season Durban stopped 80,000 bags of wet maize, and the authorities provided space free of charge to sun-dry these, but the cost of the labour and also of the tarpaulins to keep the maize off the ground and to protect it from bad weather has been a considerable tax on profits. Government is not likely to treat consignors so leniently next season. A prominent Natal farmer who scorned the idea of forwarding wet maize was convicted of doing so. His explanation was that part of the consignment had been bought from a neighbour, and the latter was brought to the Port and made to acknowledge his fault. In most cases it is recognised that farmers are not wholly to blame, as it has been proved that the merchant and speculator had used much pressure to obtain delivery earlier than the farmer would otherwise have forwarded; but wet and dry maize in one bag, sweepings, and other nefarious practices, are entirely the farmers' affair, and they must be made to see that it is against their interests to continue such abuses. Government is not providing special low railway rates to assist such people, and unless they are stopped, oversea markets will learn to do business with us on lower values.

The Laboratory Dip.

The extensive use which is being made of this preparation is furnishing us with a daily broadening experience as to its value. In most cases the results have been all that could be desired, and from the different reports that have been received—both official and otherwise—users of this preparation are well satisfied. In one or two instances, however, less favourable results have been secured, which appear to have been due chiefly to the uncertainty of composition of the arsenite of soda, which compound is liable to considerable variance in its composition as to the actual amount of arsenic contained. A statement as to the exact strength of such compound should always be obtained from the retailer.

Another point to which attention might be directed is the commencement of dipping or spraying of cattle which have not been accustomed to the use of an arsenical dip or wash. Tolerance to the use of such is rapidly established after the first few applications or dippings. It is suggested, however, that, where no dipping or spraying has been practised in the past, a preliminary trial of the dip upon about five head of cattle should be made, a small quantity of dip (say about fifty gallons)—made by using $\frac{1}{2}$ of the quantities recommended for 400 gallons—being mixed for the purpose. This trial fluid could be applied either by pouring, syringing on, or washing the beast with the solution, and if any appreciable degree of stiffness was found to follow within a

few days of such application, a further test might be made by using, say, four bucketsful of the dip mixed with another bucketful of the water, and applied to a further five head in the same manner.

In this way the exact strength of the dip suitable for the first dippings of a susceptible herd could be arrived at without much trouble, and the composition of the dip for first use adjusted, increasing the strength up to the standard as laid down after the first two or three dippings. This would be an easy matter which could be arranged by simply making good the loss by evaporation and use, from time to time, by using standard strength fluid. It must always be remembered that the destruction of tick life as completely as possible is the point aimed at, and this desideratum cannot be secured except by the use of arsenical solutions of considerable strength. As stated above, however, a beast rapidly attains a tolerance to such application, and the above preliminary adjustment is only suggested in cases where no dipping or spraying has been practised. Such instances, however, form a very small part of the whole, and in cattle habituated to the use of dipping, the formula as given is attended by the best results. If any distress is noticed at first in working oxen, it would be as well to make the mid-day outspan as long as possible by earlier and later working, a measure which our lengthening days renders possible.

Enquiry for Maize Husks.

An enquiry has been received by the Department of Agriculture from a gentleman in Capetown as to the possibility of obtaining mealie husks on a large scale for the purpose of fruit packing. His letter is of sufficient interest to reproduce here. "A friend of mine in Manchester," he writes, "thinks there is an opening for a trade in the leaf which enwraps the mealie cob (not the mealie leaf), and writes me as follows: "The other day I got some fruit from Jamaica packed in these leaves, and a man who was in my office when some was being unpacked saw these shavings, as he called them, and after examining them said:—"If this can come over dry it will make suitable packing. Can you let me have a quantity of it, and at what price? I should require it packed in 300 lb. bales, tightly packed, like compressed hay, and delivered to Durban ready for transhipment, perfectly dry and in good condition. As regards quantity, 500 bales could be taken at once if price were right, and increasing quantities in the future." I shall be greatly obliged if you can give me the addresses of large growers or dealers in your Colony, so that I may write to them and find out if there is any chance of doing business." The writer of the letter has been communicated with by the Department, but should any of our readers desire to get in touch with him direct we shall be glad to furnish his name and address.

Argentine International Exhibition, 1910.

The Minister of Agriculture has received a communication from the President of the Argentine Rural Society asking him to bring to the notice of the various agricultural associations and other bodies interested in farming, the fact that it is proposed to hold an International Exhibition at Palermo (Buenos Aires) from the 3rd June to the 31st July of next year. The exhibition is to be held under the auspices of the Government of the Argentine Republic, in celebration of the First Centennial of the Argentine Emancipation (May 25th, 1810). Persons interested who may wish to send exhibits to the Exhibition should communicate with the Secretary, Mr. E. M. Nelson, whose address is Florida 316, Buenos Aires. The date fixed for receiving applications from abroad for entries, space, etc., is the 1st December next.

A South African Book on Bee-Keeping.

A book on bee-keeping has recently been issued by the Cape Department of Agriculture, from the pen of Mr. H. L. Attridge. The book is cloth bound and well illustrated, and should be in the hands of all S. A. bee-keepers, and those commencing this pursuit. The author is well known throughout South Africa as an expert, lecturer, and practical apiculturist. By way of introduction the early chapters of the book are devoted to such subjects as the early history and progress of apiculture, its educational aspect, and as recreation for mind and body. The commercial side of bee-keeping is also touched upon. After dealing with the natural history of the honey bee the author describes the different races of bees, enumerating the good and bad points of some of the best known varieties. The South African bee is fully discussed, and certain recommendations are given to guide the beginner in selecting the most suitable kind of cultivation. The anatomy and physiology of the honey bee forms an interesting chapter. The practical management of bees is very lucidly explained, several original illustrations being introduced to assist the beginner and less advanced apiarist. Various patterns of hives and appliances suitable for S.A. conditions are illustrated and explained. Chapters on the Location of the Apiary, Subduing and Handling Bees, Driving and Transferring, Swarms, After Swarms, Artificial Swarms, Prevention of Swarming, Uniting Bees of different Colonies, Modern Methods of Queen Rearing, Feeding Bees, Introducing Queens, Robbing by Bees, Diseases of Bees, etc., are also included. All the methods advocated are given by the author as the outcome of several years experience and close study of bee life. The work is now on sale at the leading booksellers in Cape Colony, and can also be obtained on application to the Government Stationery Department, Capetown. It is also obtainable in Dutch.

Trypan Blue.

"Farmeress" has written asking certain information regarding trypan blue, but has omitted to sign her name. We would ask correspondents to note that all communications to us should be accompanied by their name and full address, together with, if desired, a *nom-de-plume* to be used in case the letter is of sufficient general interest to warrant its publication. As a rule we take no notice of anonymous letters, but as the letter before us appears to come from a reader who is unacquainted with the rules of press correspondence, we make an exception in the present case. "Farmeress" writes: "I have read all notes on ticks; can you please tell me how much trypan blue is sufficient for one animal and if kept by all chemists? I am interested in stock and should like to try it."—As far as we are aware, trypan blue has not been used in this Colony, at least to any extent, nor can we say what the dose for cattle is. So far as we know, however, this dye is of little value as an insecticide. "Farmeress" may be able to obtain trypan blue at one of the leading chemists, if she wishes to try it; otherwise they would probably be able to import it for her

Mushroom Culture.

The following information regarding the culture of mushrooms has been furnished by Messrs. R. Mason & Son, 289, Church Street, Maritzburg, who state that they are in a position to supply large quantities of Colonial made and guaranteed fresh spawn. Mushrooms can be grown in any cool shady situation, such as a stable or dug-out cellar, where an even temperature can be kept. The heat must not be less than 50 or higher than 57 degs. This must be kept moist by occasional syringing. The beds must be well drained, however, to carry off all excess of moisture. Collect fresh horse manure, or better still use 2 parts of horse and 1 of cow, and well mix together. Let it remain in a heap until it heats, usually three or four days. Then turn every second day until there is no objectionable smell each time it is turned; take care that the outsides and tops go into the inside. This operation may take a week or more according to the size of the heap. The idea is to allow all the gases to escape, which cannot be done unless the manure is well heated. Make a foundation of loose rubble or cinders, the latter are the better, about 2 inches deep, making with a slight fall to allow for drainage. Now place the manure in even layers pressing it down until it is 12 to 15 inches high. Beds 3 feet wide are the easiest to handle. If it is made properly the temperature will go up to 105 degs., but it must be allowed to remain probably three or four days until the heat falls to 70 degs.

Take a brick of spawn and break it into eight pieces, insert the pieces just under the surface, covered, about 12 inches apart. Let

them remain for three or four days and examine if it is running; this can be seen by taking a small piece of manure from alongside the spawn and noticing if there is a kind of white dew in the manure; if so everything is satisfactory so far. Now get some good soil and mix into a plaster and spread the bed over 1 inch thick. Cover over the plaster with long manure, and if the atmosphere is at all dry keep it moist. Should the atmosphere be kept in the right condition, as previously directed, this watering may not be necessary. It must never be wet, only moist. From the time of spawning, it generally takes about six weeks for the mushrooms to appear.

Cape and East Coast Fever.

A Proclamation has been issued by the Cape Government notifying that, from and after the 15th September, 1908, the District of Bizana shall be taken and deemed to be a suspected district, and that the following Regulations shall have the force and effect of law, *viz.*:—(1). It shall not be lawful to remove, or cause or allow to be removed, or permit to stray, any horned cattle from or into the said District of Bizana. (2). If any horned cattle be removed or introduced into the District of Bizana from any of the adjoining districts of the Transkeian Territories, it shall be lawful for the Headman of the Location in which such cattle may be found to take them in charge with a view to isolating them as completely as circumstances permit, and to detain them in such isolation until such time as the Resident Magistrate of the district or other officer appointed thereto by him in writing shall, after due enquiry into the circumstances of their removal, introduction or entry, issue instructions for their disposal, and such cattle shall be disposed of in accordance with such instructions. (3) It shall not be lawful to introduce any transport wagons or goods into the said district of Bizana save and except through the port of entry hereby established at Nqabeni Drift, provided that the horned cattle which have drawn such wagons or goods thither shall first have been outspanned on the Flagstaff side of the boundary, and that such horned cattle shall not themselves be introduced or utilised for the introduction of such wagons or goods into the said district. (4) It shall not be lawful for any human being, animal, article or thing, to cross the Border from the District of Bizana into the Colony of Natal save and except through Middledrift, at which place human beings on foot shall be permitted to cross the Border with their personal effects. Any person contravening the provisions of the foregoing Regulations, or interfering with or molesting any officer, Headman or other duly authorised person in the performance of any duty imposed by this Proclamation shall be liable on conviction to a fine not exceeding fifty pounds sterling (£50) or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months, unless such fine be sooner paid.

Farm Telephones.

In connection with the correspondence *re* the establishment of a system of farm telephones for South Africa, which we published last month, the General Secretary of the South African National Union now forwards the following minute by the Acting Postmaster-General of the Transvaal which has been sent to him by the Director of Agriculture, Pretoria:—"With reference to your minute (No. 13,017) of 16th inst., I beg to inform you that the current year's programme of country telephone exchanges includes the establishment of exchanges at Standerton, Belfast, Volksrust, Barberton, Ermelo, Middleburg, Rustenburg, Litchenburg, Wakkerstroom and Potgietersrust, and the enlargement of the exchanges at Heidelberg, Witbank and Vereeniging. There are already several other country exchanges. It is intended to erect main trunk lines to communicate with Pretoria and the Rand from Klerksdorp, Volksrust, Belfast, Zeerust, and Pietersburg. Connected with these main routes will be a large number of subsidiary trunk lines, and when the whole are erected it will be possible to speak easily from one end of the Transvaal to the other. Few farms will be far removed from a line when this programme is completed, and connections with farms will be given to the nearest available point on the lines.

All connections will be taken to an exchange. The exchange fixed charge of £7 10s. per annum will be payable by all subscribers, and the only addition to this for farmers will be ten per cent. of their lines outside exchange areas, existing lines being used as far as possible to minimise this cost. If, for instance, a farm is ten miles from an exchange, a trunk line from the exchange passing within two miles of the homestead, the charge would be £7 10s. for the exchange service, covering a line of one mile from the exchange as centre; for seven miles the circuit would be carried on the existing line, and for the remaining two miles a light line would be run across-country to the homestead, 10 per cent. of the cost of this construction outside the exchange area being added to the subscription of £7 10s. If two farmers become co-renters of a circuit, or if the cross-country line serve two or more farms, the yearly cost will be correspondingly lowered. In practice it will be found that this system of charge will lead to cheap telephones. Private lines between farms will also be erected, if required; but it is found that nearly all farmers wish to use the trunk lines to get into communication with their markets. The yearly subscription will cover a service to all their exchange subscribers, but for trunk line services there will be a charge of 3d. per conversation over each 25 miles of line. The arrangement in regard to these charges is experimental, and as soon as possible a fixed scale will no doubt take its place."

them remain for three or four days and examine if it is running; this can be seen by taking a small piece of manure from alongside the spawn and noticing if there is a kind of white dew in the manure; if so everything is satisfactory so far. Now get some good soil and mix into a plaster and spread the bed over 1 inch thick. Cover over the plaster with long manure, and if the atmosphere is at all dry keep it moist. Should the atmosphere be kept in the right condition, as previously directed, this watering may not be necessary. It must never be wet, only moist. From the time of spawning, it generally takes about six weeks for the mushrooms to appear.

Cape and East Coast Fever.

A Proclamation has been issued by the Cape Government notifying that, from and after the 15th September, 1908, the District of Bizana shall be taken and deemed to be a suspected district, and that the following Regulations shall have the force and effect of law, *viz.*:—(1). It shall not be lawful to remove, or cause or allow to be removed, or permit to stray, any horned cattle from or into the said District of Bizana. (2). If any horned cattle be removed or introduced into the District of Bizana from any of the adjoining districts of the Transkeian Territories, it shall be lawful for the Headman of the Location in which such cattle may be found to take them in charge with a view to isolating them as completely as circumstances permit, and to detain them in such isolation until such time as the Resident Magistrate of the district or other officer appointed thereto by him in writing shall, after due enquiry into the circumstances of their removal, introduction or entry, issue instructions for their disposal, and such cattle shall be disposed of in accordance with such instructions. (3) It shall not be lawful to introduce any transport wagons or goods into the said district of Bizana save and except through the port of entry hereby established at Ngqabeni Drift, provided that the horned cattle which have drawn such wagons or goods thither shall first have been outspanned on the Flagstaff side of the boundary, and that such horned cattle shall not themselves be introduced or utilised for the introduction of such wagons or goods into the said district. (4) It shall not be lawful for any human being, animal, article or thing, to cross the Border from the District of Bizana into the Colony of Natal save and except through Middledrift, at which place human beings on foot shall be permitted to cross the Border with their personal effects. Any person contravening the provisions of the foregoing Regulations, or interfering with or molesting any officer, Headman or other duly authorised person in the performance of any duty imposed by this Proclamation shall be liable on conviction to a fine not exceeding fifty pounds sterling (£50) or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months, unless such fine be sooner paid.

Farm Telephones.

In connection with the correspondence *re* the establishment of a system of farm telephones for South Africa, which we published last month, the General Secretary of the South African National Union now forwards the following minute by the Acting Postmaster-General of the Transvaal which has been sent to him by the Director of Agriculture, Pretoria:—"With reference to your minute (No. 13,017) of 16th inst., I beg to inform you that the current year's programme of country telephone exchanges includes the establishment of exchanges at Standerton, Belfast, Volksrust, Barberton, Ermelo, Middleburg, Rustenburg, Litchenburg, Wakkerstroom and Potgietersrust, and the enlargement of the exchanges at Heidelberg, Witbank and Vereeniging. There are already several other country exchanges. It is intended to erect main trunk lines to communicate with Pretoria and the Rand from Klerksdorp, Volksrust, Belfast, Zeerust, and Pietersburg. Connected with these main routes will be a large number of subsidiary trunk lines, and when the whole are erected it will be possible to speak easily from one end of the Transvaal to the other. Few farms will be far removed from a line when this programme is completed, and connections with farms will be given to the nearest available point on the lines.

All connections will be taken to an exchange. The exchange fixed charge of £7 10s. per annum will be payable by all subscribers, and the only addition to this for farmers will be ten per cent. of their lines outside exchange areas, existing lines being used as far as possible to minimise this cost. If, for instance, a farm is ten miles from an exchange, a trunk line from the exchange passing within two miles of the homestead, the charge would be £7 10s. for the exchange service, covering a line of one mile from the exchange as centre; for seven miles the circuit would be carried on the existing line, and for the remaining two miles a light line would be run across-country to the homestead, 10 per cent. of the cost of this construction outside the exchange area being added to the subscription of £7 10s. If two farmers become co-renters of a circuit, or if the cross-country line serve two or more farms, the yearly cost will be correspondingly lowered. In practice it will be found that this system of charge will lead to cheap telephones. Private lines between farms will also be erected, if required; but it is found that nearly all farmers wish to use the trunk lines to get into communication with their markets. The yearly subscription will cover a service to all their exchange subscribers, but for trunk line services there will be a charge of 3d. per conversation over each 25 miles of line. The arrangement in regard to these charges is experimental, and as soon as possible a fixed scale will no doubt take its place."

Articles on Farm Machinery.

Contrary to our expectations, we have found it impossible this month to publish the first of the articles on farm machinery which we promised last month, owing to the great demands we have experienced upon our space. We have much matter in hand for next month also, but hope to be able to include the first of these articles in that issue. With one or two minor exceptions all the firms we approached for assistance in the preparation of these articles have responded well, and we believe that the series will be an unique as well as a very useful one.

New Bills for Parliament.

A number of Bills relating to the farming interests of the Colony are being brought before Parliament this Session. The most important of these—"to amend and extend the Agricultural Development Act, No. 44, 1904"—we refer to at length elsewhere in this issue. This Bill seeks to obtain for the Government powers of expropriation in respect of lands not beneficially occupied. Of the others, two have at the time of writing passed the second reading in the Lower House, *viz.*, (a) "To control the introduction and to regulate the disposal of exotic animals and animal products," and (b) "to regulate the importation of animal manures." The former of these subjects the importation and sale of animals and animal products to such regulations as may from time to time appear advisable for the prevention of the introduction or spread of diseases: and the second Bill confers upon the Governor in Council similar powers as regards the importation of animal manures. A third Bill, which would have assisted in placing our nascent ostrich industry at once upon a high plane as regards the quality of its produce, was thrown out by the Lower House. By means of another Bill the Government seeks to increase its borrowing powers under the East Coast Fever Act, No. 53 of 1906, and providing for the advancement by the Public Debt Commissioners from the Consolidated Loans Fund of any sum up to £10,000 in addition to the sum of £100,000 authorised by Act No. 53 of 1906. Another measure to be brought forward is one which provides for the amendment of Section 28 of the Land and Agricultural Loan Fund Act, No. 27, 1907, a proviso being added to that section to the effect that, where an application is made for a loan for the purpose of paying off an existing bond, an advance may be made of the amount due under such bond upon a cession of the bond to the Board pending the registration of a new bond in favour of the Board. In accordance with our practice we will, if space permits, publish the main provisions of all the measures affecting the farming interests of the Colony which finally become law.

S.A. Maize Brochure.

We have received from the General Manager of Railways a copy of a brochure on maize cultivation and export, which has been prepared under the auspices of the Governments of South Africa. The objects of the pamphlet are to induce more extensive cultivation of this important crop by the farmers of South Africa and to make more widely known the quality and peculiar advantages of South African maize to the European buyer and consumer, and with these objects in view concise and practical information is given relative to markets, transport facilities (special rail and sea freights), conditions of low export rates, grading arrangements, insurance, ruling prices—European markets, bagging—sizes and weights of bags, etc., marking of bags, selling maize, C.I.F., export arrangements—preparation of bills of lading and other documents, cable payments, storage at port of shipment, maize samples, steam machinery with some hints to growers, whilst for the benefit of buyers information is also given regarding maize seasons, together with descriptions of maize and some notes on additional uses of the maize crop. In all, the brochure covers 55 pages and contains over 30 excellent illustrations; the pamphlet is, in fact, a work of art from beginning to end, and the printers (the N.G.R. Printing Works) are to be congratulated upon what is a noteworthy contribution to artistic printing in South Africa. Much credit is due also to the compiler, Mr. A. H. Tatlow, of the Publicity Section of the Natal Government Railways, for his share of the work of producing the brochure, which is as remarkable for the clearness and conciseness with which the matter is set forth and the essential facts are brought out, as it is for its artistic appearance. We understand that the brochure is being widely but at the same time judiciously distributed, and we may confidently predict a very material increase in the production and trade in the product with which it deals as a result of its timely appearance at the present stage of our export trade.

Cape Border Ports of Entry.

The Cape authorities have withdrawn Proclamation No. 373 of 1909, defining the Ports of Entry on the Cape-Colony-Natal Border for the introduction into Cape Colony from Natal of certain live stock and articles, and have substituted another therefor (No. 431, 1909), under date 16th October. This new Proclamation provides that the Ports of Entry enumerated in the schedule hereof [reproduced at the end of this note—ED.] shall be the sole Ports of Entry on the Cape Colony-Natal Border for the admission into this Colony from Natal, in the manner described in such schedule, of human beings, live stock and the articles or things specified in regard to each Port respectively." It is further provided that "Nothing in this Proclamation contained shall be deemed to affect the validity of the prohibition imposed by my Proclamation No.

116, dated 12th March, 1909, on the introduction of vehicles and goods drawn to the said Border by horned cattle through the Ports of Entry at Stanford's Drift and Union Bridge."

The Proclamation proceeds: Notwithstanding anything to the contrary contained in Proclamation No. 187 of 1899, as amended by Proclamation No. 428 of 1908, it shall not be lawful for any person, without the authority of the Minister previously obtained, to pass through or over any of the fences erected along the Natal Border from the Drakensbergen to the mouth of the Umtamvuna River, except through the Ports of Entry enumerated in the schedule hereto, or over a stile, and, in the latter case, only for the sole purpose of procuring water from the Ingwangwane, Indowanee, Umzimkulu or Umtamvuna Rivers, and further, that all persons crossing such stiles, or entering through the Ports of Entry aforesaid, shall be liable, when so required by the officer or non-commissioned officer in charge of the Cape Mounted Riflemen or guard acting under his orders, to be searched and examined for the possession of any article or thing, the introduction whereof into this Colony from Natal is or may hereafter be specially prohibited. Any person contravening the provisions of this Proclamation shall be liable, on conviction, to a fine not exceeding fifty pounds, or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months, unless such fine be sooner paid."

The following is the schedule referred to in the Proclamation:—
PORTS OF ENTRY INTO EAST GRIQUALAND.—(1) *Stanford's Drift*: For human beings, equines used solely for transport purposes, and all articles or things whereof the introduction is not specially prohibited. (2) *Riversdale*: By rail only for all live stock, other than cattle, sheep and goats and all articles or things whereof the introduction is not specially prohibited and which are not conveyed in cattle trucks, and also for human beings, and equine transport used solely for the conveyance of passengers and other personal effects. (3) *Union Bridge*: For human beings, all live stock, other than cattle, sheep and goats, and all articles or things whereof the introduction is not specially prohibited, provided they are not removed beyond the boundaries of the district of Umzimkulu, Ingeli Gate and Harding Gate, for human beings, and their personal effects, and mail bags only, under the supervision of the Border Guard.—**PORTS OF ENTRY INTO PONDOLAND.**—*Middledrift*: For mail bags only, under the supervision of the Border Guard. [N.B.—Prohibited articles or things comprise animal produce, grass, hay, reeds, rushes, herbs, plants or other vegetable matter, but do not include vegetables, fruit, cereals, or cultivated plants, provided such are not packed in grass, hay, reeds or rushes.]

Natal's Progress in 1908.

By H. J. CHOLÉS, F.S.S.

THE compilation of the agricultural statistics of Natal for the year 1908 has now been completed by the Colonial Secretary's Department and published in the *Statistical Year-Book* of the Colony; and, following the plan of previous years, I propose to examine the published results, in conjunction with the figures compiled by the South African Customs Statistical Bureau at Capetown, and endeavour to ascertain what light they throw upon the progress of the Colony during the year to which they refer.

I.—THE RAINFALL.

Before, however, we commence our study of the agricultural progress which has been made during the year, it will be interesting to study the rainfall of the year, and a satisfactory method of doing this is to ascertain the average annual rainfall of the previous ten years, 1898-1907, and the average number of days annually on which rain fell, for such of the stations for which statistics are published, and compare these figures with the corresponding figures for 1908. Such a comparison is offered in the following table:—

THE RAINFALL.

Table showing the Rainfall during the year 1908, as compared with the average annual fall for the previous ten years, at certain centres.

Station.	Average Annual Fall 1898-1907.	Rainfall in 1908.	Average No. of days per Annum on which rain fell 1898-1907.	Number of Days in which rain fell in 1908.
<i>Coast :</i>	Inches.	Inches.		
Durban ...	39.09	45.91	161	163
Stanger ...	37.96	45.43	181	173
Verulam ...	35.90	43.20	110	124
Port Shepstone ...	43.99*	52.76	127*	94
Umzinto ...	37.41†	53.18	86†	76
<i>Midlands :</i>				
Richmond ...	40.00	43.53	133	157
Pietermaritzburg ...	35.32	32.53	130	149
Howick... ..	31.40	35.06	134	123
Greytown ...	33.49	42.00	127	135
<i>Uplands :</i>				
Weenen ...	24.48‡	31.52	88‡	107
Estcourt ...	28.19	28.64	83	76

* Average for seven years. † Average for nine years. ‡ Average for eight years.

As will be seen, I have arranged the figures according to the geographical positions of the stations to which they refer, which will facilitate comparison, not only of the rainfall of 1908 with that of previous years, but also of the varying rainfall of the different geographical belts or terraces of the Colony.

A study of these figures shows that last year was on the whole a wetter year than usual, particularly on the Coast. In some of the inland districts, too, considerably more rain fell than usual. No generalisation can, however, be made with regard to the comparative number of days on which rain fell, as the figures given vary from station to station.

II.—SIZES OF HOLDINGS.

The *Statistical Year-Book* throws no fresh light on the question of the relative sizes of farms, and I do not think I can do better, as the matter is of perennial interest, than re-state the conclusions I arrived at in my examination last year of the figures given in the 1907 *Year-Book*. In the study I then made, it may be remembered, I assumed that there were approximately 4,000 farmers in the Colony, and using the figures in the 1907 *Year-Book* as a basis, I classified the farms of the Colony according to their respective areas, calculating the approximate number of holdings in each class. I repeat here the results I obtained, and I have added also a column giving the percentage which the number of farms in each category bears to the total number of farms in the Colony:—

					No. of Farms.	Percent. of Total.
1—	50 acres	...	...	...	151	3.78
51—	100 „	...	...	...	132	3.30
101—	200 „	...	...	...	158	3.95
201—	500 „	...	...	...	493	12.32
501—	1,000 „	...	...	...	683	17.07
1,001—	2,000 „	...	...	...	1,143	28.58
2,001—	3,000 „	...	...	...	602	15.05
3,001—	4,000 „	...	...	...	369	9.22
Above	4,000 „	...	...	...	269	6.73
					<hr/> 4,000 <hr/>	<hr/> 100.00 <hr/>

From this statement it will be seen that nearly 29 per cent. of the farms of the Colony range in area between a thousand and two thousand acres.

Remarking upon these figures, in my last year's article, I was able, by a few simple calculations, to give some idea of the extent to which agriculture pure and simple and stock farming, respectively, are carried on in the different geographical belts of the Colony; and it may be useful to repeat what I then wrote on the subject:—

"It may be of interest to note that 10·7 per cent. of the farms are situated on the Coast Belt of the Colony, 33·1 per cent. are situated in the Midlands, and 52 per cent. in the Uplands, the remainder belonging to Zululand, and we can now gather some idea of the extent to which agriculture pure and simple and stock farming, respectively, are carried on in the different geographical belts—Coast, Midland, and Upland. Calculating upon the same basis as before, we find that the approximate number of farms in the Coast Belt in 1907 was 430. These farms between them covered about 444,000 acres and cultivated 106,143 acres, or 24 per cent. of their total area. In the Midland Belt there were approximately 1,324 farms, covering about 2,151,740 acres and cultivating 153,719 acres, or 7·2 per cent. of their total area. The Upland Belt contained 2,080 farms or thereabouts, ranging over 4,494,240 acres and cultivating between them 81,354 acres, or 1·8 per cent. of their total area. On the other hand, the farms on the Coast Belt carry under 2 per cent. of the total live stock (horses, cattle, and sheep) of Natal, whilst the Midland farms account for just over 32 per cent., and the farms in the Upland Belt 66 per cent. Whilst there are purely agricultural farms in the Midlands and Uplands, it is thus only the Coast Belt which, speaking generally, can be described as agricultural in the real sense of the word. In the midlands the farms are 'mixed'—that is, devoted partly to agriculture and partly to stock raising—although the tendency is towards stock farming; whilst in the Uplands stock farming preponderates."

The results of the above calculations may be given in tabular form for the sake of clearness:—

			Cultivated Area (Percentage of Total Farm Area).		Live Stock (Percentage of Total in Natal).
Coast Belt	...	...	24·0	...	1·9
Midland Belt	...	...	7·2	...	32·1
Upland Belt	...	...	1·8	...	66·0

III.—CROPS AND CROP PRODUCTION.

A comparative study of agricultural statistics affords direct evidence of the progress of farming, and for the purpose of facilitating such study I have prepared tables giving the totals for the years ended 30th June 1907 and 1908 respectively. The first of these tables deals with the raising of crops, showing the number of acres cultivated and the produce reaped in each of the two years:—

CROPS.

Nature of Crop, Number of Acres of Land under each Crop, and Quantity or Value of Produce obtained, during the years 1906-7 and 1907-8.

Description.	Area Cultivated.		Produce Reaped.	
	1907-8	1906-7	1907-8	1906-7
	Acres.	Acres.		
Arrowroot	16	19	70 cwt	40 cwt
Barley for Grain	633	639	2,231 muids	1,729 muids
Beans	2,232	1,575	6,125 "	4,588 "
Buckwheat	441	352	1,184 "	1,144 "
Cayenne Pepper	32	25	15,950 lbs	12 199 lbs
Coffee	120	138	19,454 "	28,200 "
Cotton	128	206	19,080 "	15,935 "
Earth Nuts	225	94	1,874 muids	652 muids
Exotic Grasses	4,337	3,367	2,109 tons	1,132 tons
Green Crops for Fodder :—				
Barley	2 568	2,258	4,205 "	2,484 "
Millet	2,481	2,178	3,091 "	2,044 "
Oats	6,768	5,728	7,206 "	6,331 "
Sugar Cane	1,459	1,276	6,186 "	6,789 "
Other Green Crops	1,624	1,382	2,245 "	1,600 "
Hay	1,568	1,939	17,745 "	17,202 "
Kafr Corn	6,485	6,768	26,782 muids	28,424 muids
Lucerne	1,041	637	701 tons	482 tons
Mealies... ..	139,413	117,750	664,270 muids	555,432 muids
Millet for Grain	472	522	1,753 "	884 "
Oats for Grain	562	515	1,986 "	1,590 "
Onions	171	189	5,225 "	6,409 "
Orchards	35,912	35,686	—	—
Fruit Sold	—	—	£52,627	£37,957
Fruit Canned... ..	—	—	£2,099	£1,992
Fruit made into Jams and Jellies	—	—	£1,633	£1,666
Peas	414	277	1,280 muids	850 muids
Potatoes	5 541	5,342	152,435 "	143,433 "
Pumpkins	864	984	1,280 tons	1,257 tons
"	—	—	*4,658 "	*4,878 "
Sugar Cane, total area under Crop	52 187	51,260	—	—
Sugar Cane, cut during year...	14,627	13,549	—	—
Sugar	—	—	35,832 sh. tns	27,130 sh tns
Molasses	—	—	3 835,090 lbs	3,245 820 lbs
Sunflower	327	181	1,237 muids	685 muids
Sweet Potatoes	1,570	1,353	60,190 "	46,810 "
Tea	5,502	5,226	3,278,464 lbs	2,065,838 lbs
Tobacco	667	600	304,916 "	301,509 "
Turnips and Swedes	1,248	1,294	4,731 tons	4,801 tons
Vegetables	582	599	£3,019	£2,706
Wattles — Total area under cultivation	108,444	89,928	—	—
Wattles planted during year...	11,822	8,161	—	—
Wattle Bark sold	—	—	14,758 tons	11,846 tons
Wattle Timber sold	—	—	£13,617	£13,991
Wheat	381	370	1,093 muids	1,058 muids
Winter Fodder—Area set aside for	7,132	6,373	—	—
Other Crops	1,076	282	—	—

* Pumpkins grown with maize.

These figures disclose some interesting facts. As will be more fully commented upon elsewhere, the green fodder crops, such as barley, millet, oats, sugar cane for fodder, lucerne and exotic grasses, show appreciable increases as regards the area of land devoted to their cultivation. The aggregate increase is to the extent of 2,482 acres, or 18·4 per cent. over the area for 1907. The area under lucerne shows an increase of 63 per cent., which is indicative of the increased interest which is being taken in this important fodder-plant.

The areas under beans, earth-nuts, mealies, potatoes, sugar cane, sunflower, tea, and wattle bark have all increased materially, while the area set aside for the production of winter fodder has increased by about 760 acres. The area of land under sugar cane has increased by over 900 acres, and the production last year amounted to 8,700 short tons more than that of the preceding year. A fair increase is also to be noted in the area under tea, whilst the production has gone up by over 1,200,000 lbs., which is a particularly gratifying increase. The cultivation of wattles continues to increase, 11,822 acres being planted in 1907-8, as compared with 8,161 in 1906-7. The total area, it will be noticed, now stands at a little over 108,400 acres. The increases recorded in earth nuts and sunflower are doubtless due to the fact that farmers are coming more to realise that there is a fair market for these products in Natal, for the manufacture of soap; whilst undoubtedly the increase in the area under sweet potatoes is traceable to the establishment of the starch factory at Umgeni. Cotton unfortunately shows a material decrease in area, though the production was greater than in 1907; and coffee shows not only a reduced area, but also a smaller crop. The production of cayenne pepper has increased by 3,700 lbs., and the area has been extended to 32 acres.

This brief survey will suffice for the present, since I propose to deal more fully with crop production later on when I come to study each crop or group of crops individually. In passing I may add that the total area of land under cultivation by Europeans in 1908 was 390,209 acres, as compared with 347,900 acres in 1907 and 321,793 in 1906. I have already mentioned the crops to which are due the increased area under cultivation last year.

For the manuring of these crops our farmers used £36,071 worth of fertilisers imported in 1907 from overseas and from other parts of South Africa, besides quantities of fertilisers manufactured in Natal. In 1906 the imports of fertilisers amounted to £20,643; whilst last year £23,280 worth were purchased from overseas and other parts of South Africa.

The average yield per acre of each of the principal crops grown in the Colony during 1908, as compared with 1907, was as follows:—

	1908	1907
Barley (grain), muids	3'7	4'0
Barley (forage), tons	1'6	1'8
Beans, muids	2'9	3'0
Buckwheat, muids	2'7	3'6
Kafir Corn, muids	4'2	4'1
Mealies, muids	4'9	4'7
Millet (grain), muids	3'7	3'6
Millet (forage) tons	1'2	1'7
Oats (grain), muids	3'4	4'2
Oats (forage), tons	1'1	1'4
Onions, muids	30'0	24'4
Peas, muids	3'6	3'6
Potatoes, muids	25'6	24'9
Pumpkins, tons	1'8	1'8
Sugar, tons	2'3	1'7
Sunflower, muids	4'2	3'9
Sweet Potatoes, muids	29'6	27'2
Tea, lbs.	595'9	663'0
Tobacco, lbs.	750'0	650'8
Turnips, tons	5'2	4'7
Wattle Bark, tons	4'0	4'0
Wheat, muids	3'3	3'2

The area of land under irrigation in 1908 was 15,668 acres, as compared with 13,744 acres in 1907 and 13,871 in 1906. This is an interesting increase, and is another indication of the manner in which the character of our farming is improving.

The use of farm implements and machinery and other mechanical accessories is reflected in the following table, which gives comparative figures for the last three years:—

AGRICULTURAL IMPLEMENTS AND MACHINERY.

Statement showing Numbers of Agricultural Implements, Machines, and other Accessories in possession of Europeans on August 31st, 1906, 1907, 1908, respectively.

Description.	1906	1907	1908
Baling Machines	469	537	568
Carts	2,341	2,405	2,638
Wagons	2,975	3,193	3,222
Chaff Cutters	1,016	1,021	1,097
Cream Separators	910	1,015	1,068
Cultivators, Horse-hoes, etc.	4,509	4,361	4,428
Dipping Tanks—Cattle	103	118	167
" " Sheep	336	359	321
Engines and Turbines	339	341	384
Harrows	3,730	3,889	4,103
Hay Rakes	816	837	849
Hydraulic Rams	146	139	142
Incubators	325	447	517
Mealie Mills	2,083	2,086	2,262
Mealie Planters	879	868	976
Mealie Shellers	1,989	2,027	2,077

AGRICULTURAL IMPLEMENTS AND MACHINERY.—*Continued.*

Description.				1906	1907	1908
Mowing Machines	...	...	...	1,100	1,103	1,121
Ploughs	...	...	...	8,687	9,327	8,988
Potato Planters	...	...	...	114	114	124
Reapers	...	...	...	171	183	159
Silos	...	...	...	41	37	53
Windmills	...	...	...	120	120	119
Winnowers	...	...	...	442	453	444
Other Implements	...	...	...	257	364	454

In most of the categories there are increases observable, and, while these increases are not in the majority of cases large, the table shows a satisfactory state of affairs taking it on the whole. It is interesting to note, in this connection, that imported machinery to the value of £22,957 was sold to Natal farmers in 1908, as compared with £36,900 worth in 1907 and £13,637 worth in 1906.

Before passing on to the next section of our subject, a few remarks regarding labour employed by farmers during 1907-8 will not be out of place here.

The number of natives employed by farmers in 1908 was 16,086 men and 3,675 women. Of indentured Indians there were 14,115 men and 5,172 women employed; whilst 1,338 free Indian men and 263 women were also employed. European farm hands to the number of 550 were also employed. In order to show the changes which have taken place during the last three years as regards the employment of Natives and Indians, respectively, on our farms, I have drawn up the following statement, which covers as wide a period as the statistics available permit:—

COLOURED LABOUR.

Table showing number of Natives and Indians employed on Farms during the Years 1906, 1907 and 1908 respectively, and the percentage of increase or decrease in the numbers employed in 1908 as compared with 1906.

Category.				1906	1907	1908	Increase or Decrease per cent. : 1906-1908
<i>Natives :—Men</i>				14,310	14,956	16,086	12.5 increase
Women				3,426	3,273	3,675	7.3 "
Total Natives				17,736	18,229	19,761	11.5 "
<i>Indians :—Indentured—Men</i>				10,345	10,446	14,115	36.5 "
" Women				3,951	4,208	5,172	31.0 "
Free—Men				1,235	1,169	1,338	8.4 "
" Women				170	182	—	100.0 decrease
Total Male Indians				11,580	11,615	15,453	24.9 increase
Total Indians				15,701	16,005	20,625	31.4 increase

It will be seen from this statement that, whereas the number of Native men employed on farms has increased by under 13 per cent. since 1906, the number of indentured male Indians has increased by over 36 per cent., whilst the number of free male Indians (an increase in whose number would be preferable to an increase in the number of indentured Indians) has increased by a little over 8 per cent. only. With regard to women also there is a noteworthy difference in the increases: 7.3 per cent. in the case of Native women, and 31 per cent. in the case of female indentured Indians.

The average wages of Natives per month in 1908, as compared with 1907, were as follows (the 1907 figures are shown in brackets after the 1908 figures):—

NATAL.—*Coast Belt*: Men, 17s. 6d. (19s. 1d.); women, 6s. (6s. 9d.). *Midland Belt*: Men, 15s. (14s. 10d.); women, 7s. 6d. (8s. 7d.). *Upland Belt*: Men, 12s. 6d. (12s. 4d.); women, 6s. (5s. 8d.).

ZULULAND.—*Coast*: Men, 20s. (15s.); women, 7s. 6d. (5s.) *Inland*. Men, 18s. (12s.); women, 7s. 6d. (4s.).

The average wages for the whole Colony were: Men, 15s. (14s. 8d.); women, 7s. (6s.).

IV.—THE LIVE STOCK OF THE COLONY.

The numbers of live stock in the Colony, in the possession of Europeans, in 1907 and 1908 respectively are shown in the following table:—

LIVE STOCK.

Live Stock in the Possession of Europeans on August 31st, 1907 and 1908.

Description.	1908	1907
Stallions, Imported...	187	162
Stallions, Colonial ...	879	735
Brood Mares ...	10,005	9,676
Saddle and Draught Horses ...	11,463	10,872
Other Horses ...	9,643	8,899
Mules ...	4,274	2,370
Donkeys ..	5,370	2,385
Bulls, Imported ...	144	159
Bulls, Colonial ...	3,772	3,900
Cows ...	75,790	78,537
Oxen ...	59,275	62,816
Other Cattle ...	81,432	82,336
Cattle available for Slaughter...	23,083	24,599
Rams, Imported ...	417	368
Rams, Colonial ...	11,331	10,084
Sheep, Woolled ...	665,222	574,068
Kafir Sheep ...	63,423	58,039
Persian Sheep ...	24,984	18,907
Sheep available for slaughter ...	64,162	67,199
Angora Rams, Imported ...	97	77
Angora Rams, Colonial ...	1,453	1,318

LIVE STOCK.—(Continued).

Description.	1908	1907
Angora Goats	16,799	86,041
Kafir Goats	50,078	44,375
Boars, Imported	66	52
Boars, Colonial	1,410	1,440
Sows	6,804	6,293
Other Pigs	17,397	17,137
Pigs available for slaughter	8,125	7,606
Fowls	329,908	257,703
Ducks and Geese	24,497	21,147
Turkeys	9,296	7,347
Guinea Fowls	20,561	16,267
Pigeons	15,422	11,032
Rabbits	3,413	2,735
Ostriches	961	876
Bee Hives	1,925	1,326

The presence of East Coast Fever in the Colony is easily traceable in some of the figures in this table. A decrease in the total number of cattle in the Colony is, of course, the first indication one would look for, but apart from this we find very substantial increases in the numbers of mules and donkeys, for transport purposes,—1,900 in the case of the former and 3,000 (or over 50 per cent. more) in the case of the latter;—whilst the number of horses has also increased. Further, we have noteworthy increases in the numbers of sheep, there being 661,466 in 1907 and 765,377 in 1908—still further indication of the connection between sheep farming and cattle farming to which I referred in my last year's article. The following statement will be found interesting in this regard, showing the total numbers of cattle and sheep (in possession of Europeans) in 1906, 1907 and 1908, respectively:—

EAST COAST FEVER AND SHEEP FARMING.

Table showing Numbers of Cattle and Sheep in Possession of Europeans in Natal in each of the four years 1905-1908 with the respective yearly decreases and increases per cent.

Year.	Cattle (No.).	Decrease per cent.	Sheep (No.).	Increase per cent.
1905	273,376	—	587,151	—
1906	243,857	10·8	600,055	2·2
1907	227,748	6·7	661,466	10·3
1908	220,413	3·3	765,377	15·8

From this table it will be seen that, as a disease reduces the number of cattle each year and cattle farming comes to be regarded, temporarily,

as unprofitable, interest in sheep farming tends to increase. The increase in interest in sheep farming has not, however, in the present case, taken place in the proportion indicated by the percentages in the column to the extreme right of the table, any more than the percentages to the left of the thick line indicate the actual losses of cattle from disease: in each case, natural increases in numbers have to be taken into consideration as affecting the percentages of increase and decrease. At the same time, the table shows the renewed attention which is being given to sheep farming as a result of East Coast Fever

V.—ANIMAL PRODUCTION.

The next table shows the nature and quantity or value of animal products turned out by farmers during 1908 and 1907 respectively:—

ANIMAL PRODUCTS.

Nature and Quantity or Value of Animal Products turned out by Farmers during the years 1906-7 and 1907-8 respectively.

Description.	1907-8	1906-7
Bacon and Hams, lbs.	345,434	322,866
Hides Horns, and Hoofs, £	4,379	3,124
Lard, lbs.	56,289	47,616
Meat other than Pork, lbs.	130,636	124,105
Pork, lbs.	135,485	152,628
Butter made on Farms, lbs.	366,527	369,812
Cheese, lbs.	15,477	14,868
Milk sold other than to Creameries, galls.	177,333	169,247
Eggs, dozens	472,010	426,430
Honey, lbs.	13,550	8,103
Ostrich Feathers, £	769	867
Mohair, lbs.	219,825	207,628
Wool, lbs.	2,160,905	1,979,999

Last year we noted a considerable increase in the quantity of hides, horns and hoofs sold by farmers as compared with the previous year; and, as will be noticed in the foregoing statement, there is another noteworthy increase, in respect to 1908 over 1907. The figures for the three years are: 1905-6, £1,977 value; 1906-7, £3,124; 1907-8, £4,379. There is also a further increase in the number of eggs sold by our farmers; and I would draw attention, too, to the gratifying increase in the quantity of honey produced. In 1906 the production was 7,244, so that it has increased by over 87 per cent. in two years.

Further remarks regarding animal products I will postpone for the next section of this article, dealing with the trade of the Colony in 1908.

(To be continued.)

Breeding of Horses for Remount and Saddle Purposes.

Lt.-Col. H. WATKINS-PITCHFORD,
P.V.O. and Staff Officer Remounts, Natal Militia.

(A Paper read at the Fifth Annual Conference of the Inter-Colonial Agricultural Union.)

WHEN your Secretary a short time ago asked me to read you a short paper on any subject I might choose I hesitated for several reasons, as not only was it difficult for me to see how I was to find the time to write a paper of sufficient interest to lay before you, but—a greater difficulty still—I was unable to think of a subject which would promise to be of use as well as of interest. It was not until I noticed on the agenda an item dealing with the question of breeding from cast military mares and an appreciation of the far-sighted and helpful action of General Lord Methuen that it occurred to me that I might possibly make my subject *apropos* of this matter and help this very useful scheme forward in a small way by dealing, in not too technical a manner, with some of the points which concern the horse-breeder generally, and especially the breeder of that class of horse known as the military remount.

It seemed to me that not only would the subject be one fresh in your minds, but the time also was an appropriate one for dealing with a subject which might become one of importance to you both from a consideration of our own South African needs and, from the broader point, of the possible future needs of our wide Empire.

Matters of South African Defence are—with many other weighty considerations of State—about to be cast into the melting pot of reconstruction to emerge on a simpler and more adequate lines than those to which we have been accustomed as citizens of different—and often differing—communities in the past.

Whatever the issue of the deliberations of those responsible for forming our defence system there is no doubt that the outcome must be an increased expansion of our existing machinery for defence, which, as a necessary sequence, must mean the increase of demand for a suitable class of horse for South African Military Service. This, however, is a limited horizon compared to the needs of the Empire in the same respect, and the obligations of South Africa as a country to which the Empire may look increasingly for the supply of remounts has been increased by the recent unification of its component States.

There is therefore an unlimited market for the South African Remount provided the right class of animal can be brought to that market, and the demand is one which will increase rather than decrease with time and may be looked to to amply repay the breeder at all times. In peace the deficiencies caused by disease and casting from age or wear must afford a steady demand, while the calls of war may at any time cause the demand to greatly exceed the supply. We all know the wastage of horse-flesh in war. War falls more heavily upon the horse than upon the soldier by reason of the privations and exactions of active service. A horse on active service is not easily exempted from duty, and it is too often the case that—with General de Black—we have to say: “a wounded horse that can still serve must still serve,” and he gives the example—quoted in Smith’s Hygiene—of the horse which during the cavalry fight of Saalfeld—in spite of its back being stripped of skin—carried the man who slew the Prince of Prussia. In action itself the horse always fares worse than his rider. In the charge of Balaclava 100 horses fell to 60 men, at Waterloc the British cavalry lost 100 horses to every 50 men, while our artillery in that same famous fight lost as many as 100 horses to every six artillerymen.

Such a fact may have inspired Lady Butler’s fine picture of “Patient Heroes,” the depiction of artillery horses under fire so familiar to every horse-lover.

The losses in action, however, are small compared to the dreadful waste of horse-flesh on lines of communication, marches, starvation and exposure.

During the Russian campaign Napoleon lost from 20,000 to 25,000 horses per month. Coming to times within our own memory and experience we all know the enormous wastage of horse-flesh during the South African campaign, and from the experience gained at that and other times we know that future wars will—if of any magnitude at all—entail upon our Remount Department the necessity of completely re-horsing all our mounted regiments six months after they have taken the field.

The demands of active service, however, with its uncertain and fluctuating requirements, do not afford the breeder the steady and certain market upon which he must depend if he is to seriously lay himself out for the production of a class of horse suitable for military use. The demands of peace time, however, give this assurance. Colonel Gornet, of the Remount Department of the War Office—speaking recently at the Royal United Service Institution—stated that as many as 173,000 horses were wanted to bring our units up to a war footing, and that to mobilise fully we need 53,000 additional horses for the Regular Army and 120,000 for the recently formed Territorial Force, while Sir Charles Dilke stated that while we had on our present peace footing 11,368

trained cavalry men at Home we had only 7,577 horses of all ages. Even within the last month we have seen the great difficulty of mobilising one division of regular troops in the Aldershot district. The press informs us that "every available horse in the Aldershot Command with all those brought down by the Territorials and several train loads of omnibus horses from London have been pressed into the service to turn out this one incomplete division."

The above facts and figures all tend to point the certainty of the market for the South African remount if the stock-raiser will take the trouble to cater for that market, and not, according to our time-honoured national custom expect the buyer to adapt his requirements to the particular pattern of the goods we have to offer.

A QUESTION ANSWERED.

To the question as to whether South Africa can produce a class of horse suitable to the requirements of the military service of our Empire in any part of the world and capable of holding its own against the Argentine, Austrian, or even the Australian remount, there is no hesitation in replying "Yes." On the one all-important point of stamina—of that endurance under trying circumstances which is so essential a point in a campaigner—there is no doubt the South African remount can hold its own with the best, and even excel the majority. This has been frequently demonstrated. In 1857, at the time of the Mutiny, we sent to India 5,482 horses bred in South Africa. These horses had been produced from the Cape or Native bred mares mated chiefly with the English thoroughbred sires introduced into the country in numbers during the Governorship of Lord Somerset and subsequently. The South African remount sent to India, though not a beauty, won—after much initial prejudice against his appearance—an excellent reputation based upon the principle embodied in the old adage "handsome is as handsome does." The first complaints against their undersized appearance rapidly gave way to the opinion that for staying power and general "good doing," under all the trying circumstances of a very trying campaign, the Cape remount was unsurpassed, and this good character he maintained later amid opposite climate conditions during the rigours of the campaign in the Crimea, where Cape horses were taken by several of the cavalry regiments ordered from India to the seat of war.

Years ago an officer writing to the *Country Gentlemen's Paper* about the Cape remount says: "There is no doubt the Cape horse stands the Indian climate much better than the Australian horse, being a hardier animal and continuing fit for work to a much more advanced age. The Cape horses imported during the Indian Mutiny are still spoken of by cavalry and artillery officers as the finest lot of horses ever imported for army purposes into India."

But to you, gentlemen, as South African stock-raisers there is no need to labour this point of the endurance and stamina of our South African horse, nor is it upon this ground that our position will be likely to be assailed when we compete with other horse markets in supplying the remount needs of the Empire.

QUESTION OF STAMINA.

The all-important question of stamina in the South African Remount may be considered as satisfactorily proved by the trials and experiences of the past in distant parts of the world, if indeed any further proof were necessary to augment our own knowledge of the staying powers of the average South African horse. There is, however, the reverse to the medal, and we shall see that stamina is not the only desirable characteristic in a horse which is to be suited for military purposes. Conformation, handiness, symmetry and size must be sought and certain defects must be guarded against, if we are to compete successfully with the other remount markets both in and outside our Empire.

Thirty years ago an officer of the Imperial Service who had been stationed at Kingwilliamstown, the headquarters of the Army during the campaign of 1878, states he had an opportunity of seeing some thousands of horses sent down for remount purposes between Queens-town and the Orange Free State, and he records his opinion that—as compared with the horses of 20 years before taken to India during the Mutiny “the breed of horses which are in this country is steadily degenerating year by year and unless the subject is taken up by the Colonial or Indian Government I think in a few years there will hardly be a good remount in the country.” This was over thirty years ago.

Twenty years ago an official report was furnished to the War Office describing the South African remount as “Small and stunted in growth, deficient in bone, pinned in at the elbows, very badly coupled and ribbed up with bad drooping quarters, badly developed muscles of the croup and thighs, split up behind with crooked hind legs, the hocks being very far back,” the only thing conceded in his favour was that he was possessed of a “good shoulders and forehead.” In fact, the South African remount was officially “damned with faint praise” despite his previous records of meritorious service in sun and snow. That there was much truth in the foregoing official indictment cannot, it seems, be denied, for all the available records and literature of the day concur in stating that the Cape horse of some twenty-five years ago had deteriorated to a marked extent when compared with his forbears. The cause seems to have been chiefly attributed to the class of stallion introduced about that time for breeding purposes. Flashy, unsound, or weedy thoroughbreds, bought for a song at Tattersall's and imported at a high figure for the use of the South African breeder seems to have been the

chief cause of this period of degeneracy, which was further increased by the recognition of the part of the South African farmer of the fact that Merino sheep, Angora goat, or ostrich farming found a surer market and gave a better profit than the breeding of a class of horse which fetched but a poor price when placed upon the market. In addition to this factor, carelessness in the supply of, or deficiency of, food supply for the young stock and brood mares (which seemed to have been the rule rather than the exception) must have left its traces upon the horse of that time.

Such at any rate seems to me from a perusal of the literature of the day to have been the causes justifying the above unfortunate description of the South African remount. All writers concur in criticising first, the small size, and, secondly, the conformation of the hind quarters generally. Colonel Nunn, the late P.V.O. of South Africa, summed up the matter in the following words: "In fact the South African horse is, although small, good before but bad behind the saddle," and though this criticism was uttered some years since and matters have much improved, there is no doubt room still exists for much physical improvement, particularly in the direction indicated.

Let us briefly glance then first at the question of conformation, and particularly the points which lead to a remount being described as "bad behind the saddle."

As this is the region specially indicated and consistently criticised in the past I will confine my remarks to the parts "behind the saddle" for—as you will know—to attempt anything like a description of the points of the horse generally—or even an exhaustive description of the points "behind the saddle"—would occupy much more time than we have at our disposal just now without being of much use to us in considering the typical shortcomings of the South African remount.

Let us take then the most important of the defects of this region. As directly concerned in the weight-carrying and propelling powers of the horse, I consider the conformation comprised under the terms "slack in the loins," "badly coupled" or "poorly ribbed up" to be the most important defect now under our consideration. This condition is due to several structural weaknesses combined, but it finds its expression apparently in the length and direction of the last or 18th rib and the dimensions of the bones of the spine in the region of the loin (or what is termed the length of the lumber vertebrae and their transverse processes). If this last rib tends to lie flat instead of springing boldly outwards and backwards from the spine, the condition of bad "ribbing up" exists, and where in addition—as is generally found—the backbone tends to undue length in the region of the loin—and particularly where these transverse processes are short—there the condition of "bad coupling" and "slackness of the loin" is found.

The outline of the horse shown in the diagram is that of a well-coupled closely "ribbed up" animal such as would afford space for the tips of three or four fingers only between the last rib and the point of the hip.

Compare this diagram with the next showing the hind quarters in skeleton of a horse of the same height. If we take this diagram and place it over the first one we shall have a horse good in front but possessing just the fault so frequently attributed to the South African horse. I have intentionally exaggerated slightly the faulty points for the sake of emphasis, but the outline—even as it stands—must be familiar to all of us, for we meet horses of this stamp every day. Observe the weak back with that little depression between the loins and the croup so frequently seen in the weak-backed horse. This hollow is generally ascribed to too early breaking-in and over-weighting a horse. These may be contributing causes, but you will find this conformation in probably 15 or 20 per cent. of our horses before they have ever known a saddle. The short sloping quarter with goose rump, and the low set tail differ greatly from the lines possessed by our model remount. Passing the eye down the sloping haunch, notice how a vertical line would fall if starting from the point of the buttock or say the root of the tail. We see such a line passes almost entirely in front of the lower leg and reaches the ground through the hoof. Draw a line similarly in our model and we shall see that the line passes entirely behind the whole length of leg (both horses are depicted in a normal standing attitude).

Such a position constitutes one of the faults enumerated above in the official report when it describes the South African remount as having his hind legs and hocks placed "very far back." It is not a pleasing conformation neither is it a strong one, tending as it does to place the horse's centre of gravity far back, but I do not think the charge is so serious as that brought against the bent or "sickle hock." This conformation (or malformation) is essentially bad, being both weak and unsightly. You will notice in our model that I have drawn a dotted line down the two long bones forming this hock joint, and if you measure the angle these lines make as they meet you will find they enclose an angle of about 45 degrees. Similar lines drawn through the long bones of the horse upon the other diagram embrace an angle some 10 or 15 degrees less—which may not seem very much, but it counts for a great deal when the question of strength is considered, besides greatly altering for the worse the general appearance and symmetry of the horse. We can expect neither endurance nor speed from a hock-conformation of this nature, and both these latter points are essential in the remount. Amongst horsemen recently arrived in South Africa and making the acquaintance of the South African horse for the first time it is always a matter of remark and surprise that horses with hocks (in which exist all

the weaknesses to which horses' hocks are liable) seem to keep sound under conditions of work which, in Europe, would inevitably produce spavin, curb, thoroughpin, etc., and other unsound conditions.

The reason for this immunity is, I think, to be found in the early surroundings of our young horses, the greater liberty of movement, and the more hilly and broken nature of the ground upon which a livelihood has to be picked up. These factors all tend to a strengthening and developing of the joints to which the European colt is often a stranger.

The fact, however, that the hocks of our horses seldom give way is no argument against the improvement of a conformation which is unsightly and incapable of furnishing the speed so necessary to the military horse (which must be capable of rapid movement over long distances), and we may lay it down almost as an axiom, I think, that the straighter the hock the better the speed. All our great gallopers have possessed this so-called "straight dropped" hind leg. Broad gaskins and straight hocks are points which the breeder of remounts would do well to especially carry in his mind as desirable features. If these are secured the other desirable points must almost of necessity follow. A good hock such as we have been considering may sometimes be found with a sloping quarter and low set tail, but as a rule if the hock is good and well "let down"—as the saying is—the conformation of the quarter and loins will be good too.

Now let us glance briefly at the rear aspect of our remount. The sickle hock or the hock "too far back" will generally constitute or exist together with the condition known as "cow hocked," i.e., a tendency for the hocks to approach each other instead of being well separated and allowing the lower leg to drop vertically as in the diagram. You will notice the incidence of the lines in the two hind quarter representations. In one case lines running through the centre of the lower leg remain parallel, or almost so, while in the other case the lower leg-bones are so far out of the vertical that similar lines drawn through their centre converge about the croup.

This conformation of hock is so common that if you will notice the next twenty-five horses you see I do not think you will find one of them which will pass the critical test of the plummet line, all degrees of variation from the vertical being noticed, from the nearly upright to the extreme of the two hocks almost touching each other at the standing posture. The absolutely vertical hock will be so rarely met that it may seem that I am giving a counsel of perfection when I set it up as a pattern, but there is no doubt that the more nearly we can approach to the vertical line described above the sounder and more speedy a conformation we shall attain to, while as regards the look or appearance of the straight *versus* the "cow hock" I hardly think there will be a difference of opinion on such a point. The low set tail will, of course, obtrude

itself more on the notice from the hind view, and from here we shall be able to judge of the presence or absence of that condition "split up behind" which is shown by drawing aside the tail—a condition recorded by more than one of the critics of the South African horse in the past.

We have thus briefly reviewed the main faults which go to make a horse "bad behind the saddle," and it is not necessary for me to point out the manner in which such fault may be avoided. The old aphorism that "like breeds like" holds as good of the hindquarters of the horse as of anything else in Nature. Remembering this we see that we must secure in sire, and as far as we possibly can in dam too—that conformation which will tend to counteract or eliminate these particular points or weaknesses which have subjected our horses to criticism in the past.

The type of horse brought forward as an illustration in profile has been intentionally depicted as compact and heavy-boned. If you take the trouble to measure him you will find his height at the withers about equals his length from breast to buttock which as you will know is not a conformation made for great speed. I have thought it better to emphasise the form of the compact handy horse rather than err possibly on the side of the long light-boned offspring of the weedy thoroughbred which is responsible for many of the unfortunate points of the South African horse of to-day. The horse depicted will make an excellent mounted-infantry horse, handy and—from his light fore-hand and straight-dropped hock—reasonably speedy. His height will be about 15 hands, and the shank bone measured below the knee will be at least 7 inches, while he should girth well at, or about, 70 inches. If we aim more ambitiously at producing a horse suitable for a cavalry remount we must increase our height by, say, a couple of inches. Notice the effect of increasing this horse's height by $\frac{1}{4}$ of an inch upon the diagram, an equivalent of $\frac{1}{33}$ of his present height. (Although in our diagram we have converted our mounted infantry horse into a cavalry horse by simply adding to the length of his cannon or shank bone, the breeder will guard against a principle which increases total height by increasing only leg measurement.) Still as he now stands he makes a passable cavalry remount of about 15-2 $\frac{1}{2}$ hands, a trifle long in the leg but not weedy or long in the back, possessing a fair girth and good back ribs, a horse which would carry a light weight cavalryman and go all day with ease.

The horse fit for a gun team either of horse or field artillery will need more bone and substance, particularly for horses intended as wheelers. Breeders will have their own opinions as to the best method of securing the desirable amount of bone and substance, and the question of the thoroughbred *versus* the hackney sire has been so well ventilated in the past that it is not my intention to step upon this debatable ground, except that I see no reason why the necessary bone and substance for the heavier class of artillery remount should not be obtained from the

big-boned compact thoroughbred sire, while for the lighter class of cavalry and mounted infantry horse I believe the thoroughbred sire will not be equalled, provided the mares are chosen carefully in the endeavour to produce progeny as near to the requisite type as possible. Misfits will, of course, always occur, but the requirements of our larger towns and industrial centres will readily find a place for them even if the remount officer does not purchase them for service in the humbler capacity of pack horses, etc., on lines of communication, etc.

There is one point, however, gentlemen, in conclusion, which I must deal with in consideration of the conformation of the South African remount. Again and again in the past history of the South African horse one meets the criticism of light bone, "stunted undersized" horses. This condition of affairs resulted, I believe, from several causes: first, the indifference as to the choice of the mare—any mare that was no good for anything else being thought good enough to carry a foal; second, to the undesirable character of the sire, who was either a nondescript local equine product or perhaps a flashy thoroughbred of a weedy type originally hardly good enough to castrate and keep as a general service horse. But perhaps the factor which contributed most of all to the low estate of the South African horse was the treatment meted out to him in his youth under a mistaken system of economy or an erroneous idea that the free life of the veld with the meagre livelihood it afforded would tend to develop the necessary traits of hardihood and endurance. If a sufficiency of food, of properly balanced constituents, could be ensured under natural conditions all the year round the argument for a natural life would have greater weight, but such—in these days of enclosed farms and increased tillage—is rarely the case, and—if we would avoid small size of bone and inevitable stunting in all proportions of our youngsters they must be kept growing steadily without check on an abundance of nutritious food, avoiding the distention of bulky in-nutritious feeding which tends to destroy the symmetry of the growing colt. Such treatment implies at least one good feed a day and shelter during nights and in cold weather. We need then have no fear that we shall produce a weedy youngster. Unlimited freedom under natural conditions with adequate feeding will eliminate the "weed" if we have been but moderately careful in our selection of sire and dam, and we shall always bear in mind the common saying that "a good big horse is better than a good little one." At any rate the South African remount breeder will find the price of the one more satisfactory than that of the other. Handiness, hardiness and speed can, by selection and care, be bred as well into 15 hands as into 14 hands height, and there is no reason whatever to think that the increased development to be secured by careful mating and early feeding will do otherwise than increase the existing good points of the South African remount and eliminate the bad.

From the item on the agenda, and from a copy of a circular your Secretary was good enough to forward me, I see that a definite effort is to be made to stimulate the breeding of horses suitable for remount purposes by the use of cast military mares. This appears to me an excellent scheme and one likely to afford an opportunity of obtaining as brood mares animals possessing the requisite size and substance. It goes without saying that the mares chosen for this experiment will—although cast—be free from hereditary defects. This very important point may safely be entrusted to the care of your Veterinary Advisers, after which point the outcome of this far-reaching and interesting experiment will rest with the breeder himself.

The terms of transfer seem to me reasonable, as does also the suggestion that the progeny secured shall in due course be offered first to the Imperial remount authorities before being otherwise disposed of. These conditions are not so hard as those, while I quote, by which Henry the VIII. of England sought to stimulate the breeding of war horses within his realm by enacting that "Archbishops and all Dukes shall keep seven entire trotting horses for the saddle, each of which is to be at least 14 hands high. Every clergyman possessing a living of £100 per annum, or anyone whose wife shall wear a bonnet of velvet is to keep one trotting entire horse under penalty of £200."

I fear nowadays we cannot fill the mounted ranks of our world-wide defence force by resorting to that "velvet bonnet" clause, and the arrangements now made between the War Office and your Union seem to me the next best action to take. The movement is an excellent one, and I think starts a new era in the history of the South African remount. I feel confident that we can, if working on right lines, not only remove the reproaches of the past but can aspire to make the South African remount a model for the rest of our Empire horse-breeders to copy. I congratulate you, gentlemen, on the effort towards this end which you are now initiating.

Don't be afraid of work; you are always paid well for it at the finish.

It is time well spent to handle young colts as much as possible, always in a very gentle manner. It is a great mistake to treat colts harshly or to frighten them. Watch the help, especially the boys, who sometimes takes a vicious delight in frightening colts to see them jump.

The Seasoning and Characters of Natal Native Timbers.

By C. W. CHILVERS, Crown Forester, Ingeli.

It is so often said by woodworkers and others that our indigenous timbers are of little use owing to their tendency to warp and shrink, that a few remarks on the methods used by sawyers in this country may be interesting.

In the first place, the sawyer obtains a license for a tree at any time of the year; it is felled about 2 to 3 feet from the ground and the required length cut off. The "butt" end is shaped into a rough cone to facilitate "slipping," a 2-inch hole bored through and a chain inserted, to which the span of oxen is attached, and it is then "slipped" to the pit. Here the "kop" or rough cone is cut off, the log "lined up" and levered or rolled on to the transoms placed across the pit, set plumb and wedged up firmly. According to the diameter of the log (if yellowwood), two or three cuts are made from end to end about twelve and a half inches apart. After this preliminary "breaking down" is completed, the twelve inch "flitches" are "lined up" at right angles to make boards, 1 x 12, and planks, 3 x 12, or 4 x 12, these latter being afterwards converted into scantlings, 3 x 4, and purlins, 3 x 2.

The pieces of timber are stacked on top of each other, with no strips between to allow air to pass through, consequently they have no chance of drying properly, and in most cases of summer-worked timber soon become covered with a white fungus or mildew. The timber sometimes remains for weeks inside the forest, but is more often "slipped" outside and stacked in the same close manner as before, *but exposed to sun and wind*, with perhaps a slab on top to prevent the top pieces "warping." Little care seems to be taken to see that the stack is set true and "out of wind."

Now, most authorities are agreed that it is best to fell trees when the sap is down (April to July being the best months in Natal), but proper seasoning is of more importance than the time of felling.

The "crown" is better left on till the foliage has wilted, as the leaves remove a considerable amount of sap. The log should be removed from the forest about a fortnight after felling, *but not left out in the sun and wind*. Barking greatly assists the drying process, reduces the weight, and renders some kinds less liable to be attacked by boring insects (c.f. Fourcade, pp. 61, 162), e.g., Ironwoods, Essenwood, Dog Plum and Cape Beech. To avoid undue splitting the log should be cut through the

heart as soon as possible after removal. Some kinds, such as Essenwood, Dog Plum and Cape Beech should be converted into lumber soon after, and it is generally believed to be best to immerse them in water for a fortnight; others, as Sneezewood and Black Stinkwood, may remain for months before being further cut up, but in this case the time required for seasoning is prolonged.

Natural seasoning may take from three to ten years, according to species and size, but may be accelerated by soaking the logs in water, by steaming, or by placing in hot air kilns. "During the process of seasoning, timber loses one-fifth to one-seventh of its weight and shrinks considerably, a plank of Oak or Yellowwood may shrink one-twelfth in width, and one of Pine or Stinkwood one-fortieth." (Fourcade, p. 162.) Yellowwood also shrinks appreciably in length.

Sawn timber should be stacked in a dry place, not exposed to strong sunshine or winds, but air must be allowed free circulation all round each piece; this is best attained by placing strips of wood, half-inch by three-quarters, at intervals of about three feet between each piece, the bottom one being well supported on joists carefully set true and "out of wind." Stacks should be turned over occasionally, especially at first.

Yellowwood being far superior to Pine for flooring could well be cut up into seven inch "flitches," and stacked for a year before being converted. This timber is easily worked and has a handsome appearance when oiled or polished, it takes glue and stains well, and in general is suitable for most kinds of joinery. Being a fissile wood it is best to bore holes for nails at ends, and taper grooves and tongues are preferable. It is possible to obtain lengths of 70 (seventy) feet and over (I have seen poles close on 80 feet at Impetyne Forest, and some 4 feet in diameter, and, as far as it is possible to judge, quite sound).

I know of a Yellowwood floor—of six inch boards—laid down, I am given to understand, over sixteen years ago, the joints of which are still quite tight; this is more than can usually be said of a Pine one; also of a ceiling of twelve inch boards put up about three or four years ago; the joints of this are as tight as when first made. In the old portion of the Ingeli Forest lodge there is a batten door of Yellowwood made about four years ago, the total joints of which are now—our driest time of year—open $\frac{1}{4}$ inch. This door has never been painted and is about five feet from the kitchen stove with a corrugated iron roof just above it. I understand the boards from which it was made were seasoned in water. For comparison, there is a batten door of Pine, unpainted, erected two years ago in the new building; the total joints of this are open $\frac{5}{8}$ inch, or *two and a half times as much as the other*, and this door is in a much more favourable position, being protected from the roof by ceiling and not so exposed to draughts. The floor of the new building is of Yellowwood not grooved and tongued; this timber was far from seasoned when used,

but the joints will compare favourably with many Pine floors I have seen.

The climate of Natal, with its dry, windy winters and wet summers, is particularly trying to timber of all kinds, even Mahogany and Boxwood being affected. There is therefore all the more necessity for careful seasoning.

We have many other valuable timbers in our forests, and a little experimental work is needed to demonstrate what can be done with them. Experiments should be tried to determine what are the best methods of seasoning the various kinds, and the sizes to which they will cut, so that the time required may be shortened without their being liable to warp and get crooked during the process.

Waterwood, Lemonwood, Wild Peach, Wild Chestnut, Camdeboo Stinkwood, Knobwood, the Essenwoods, Bitterbark, Cape Beech, Bush Willow and others are all worth trying. I know from personal experience that Lemonwood is a useful timber, having used it quite green for making window sashes, and found there was no appreciable shrinkage; also when dry it made most excellent T squares, superior to some made at the same time from dry Black Stinkwood. It is easy to work, has a pleasing appearance, especially when showing the "silver grain," and it takes nails well. This tree would cut up into scantlings for framework or sleepers. The Essenwoods should be valuable woods for cabinet work: they are light, easily worked, and possess fine figures, well brought out by polishing. They require very careful seasoning and are not suitable for outside work. Bitterbark or Quar is an exceedingly hard wood; it might take the place of *Lignum Vitae* for bearings of high speed shafting, mangle rollers, heads of braces and other tools, skittle balls, etc. Bush Willow is rough and has a somewhat similar grain to Flat Crown, so well known for naves of wheels.

Of Black Stinkwood, Black Ironwood and Sneezewood there is little need to write, for most people recognise that they have some value, though the latter, which ranks equally with the most valuable timbers the world produces for marine and such like purposes, is only considered fit for fence posts. The checking of Black Ironwood was found at Qudeni to be considerably reduced by placing the sawn timber in a steam box connected with the engine exhaust for a few days. Black Stinkwood might be tried for tobacco pipes, but as these are mostly made from roots it is to them we should look if the manufacture is seriously contemplated.

Sow your seeds and look after them; they will do the rest.

Inter-Colonial Agricultural Union.

FIFTH ANNUAL CONFERENCE.

(Continued from page 354.)

THE following discussion took place on Mr. Alexander's motion *re* East Coast Fever:—

Mr. Hull (Rhodesia) referred to the success which had attended their efforts to stamp out the disease in Rhodesia, and said that the disease was no more hopeless—in fact, it was less hopeless—than lung sickness or rinderpest. In Rhodesia they had freed their herds of the disease, without the aid of any paternal Government. Individual effort was necessary. (Hear, hear.) The fault had been that the regulations had been subjected to a vast amount of clipping, which to a certain extent nullified the good effect of those regulations. It was absolutely useless to say that the disease was hopeless. In Rhodesia they drew up a series of regulations, by which they made every farmer in the country a policeman or a detective. In the clean areas, before a man could move cattle, he had to get the written consent of every other farmer in the district. This might seem cumbersome, but the farmer was in a better position than anyone to say whether or not a permit should be granted. Money alone would not get rid of the disease; the regulations must be enforced. (Hear, hear.)

Mr. Mitchell (Natal) said they had been hampered in Natal by two things: one was lack of funds, and the other was fear of the Native. Mr. Gray, the Chief Veterinary Surgeon of the Transvaal, had told them that their one sheet anchor was universal branding, but this was never enforced because the Native Affairs Department would not agree to it.

The Hon. W. A. Deane (Minister of Agriculture) said he hoped that members, especially Natal members, would keep strictly to fact. He emphatically contradicted Mr. Mitchell's statement with regard to the meting out of different treatment in the case of whites and blacks. Outlining the policy of the Natal Government in regard to the suppression of East Coast Fever, Mr. Deane said that Government wanted to secure co-operation between the farmers and the Government, and for this purpose a large meeting of representative farmers was called. Their suggestion that the movement of cattle should be controlled by the farmers themselves was adopted by the Government. The system had, however, proved ineffectual, and the Government had been obliged to re-assume direct control of the movement of cattle. Fencing had been gone in for, and £18,000 had been spent for the purpose during the last

eighteen months, whilst £30,000 was due to be spent in the near future. They also had adopted the policy of stamping out, the method of which was to remove cattle for slaughter from infected areas, and pay compensation therefor. They could do nothing more, owing to want of money. There were still several divisions free from disease, and these districts had been kept clean by the stamping out method. With the experience they had had, they had come to the conclusion twelve months ago that stamping-out must be effected. Diseased and in-contact cattle must be slaughtered and the district fenced. The other Colonies had been approached to make a contribution sufficient to provide for the complete stamping out of East Coast Fever in Natal. A board was to be appointed, consisting of representatives of the contributing Administrations. Unfortunately, this suggestion had not been adopted by the Colonies approached, each Government in turn refusing to help.

In Natal the largest cattle owner was the Native, and these Natives were all over the Colony. The Native's co-operation was sought. He (the speaker) toured the Colony, and large gatherings of Natives were organised to whom he explained the disease and the methods proposed for its suppression. The Government, however, met with opposition from the Natives everywhere. Illicit movement of cattle was largely the cause of the spread of the disease, and the Native was the chief offender, and this in spite of all restrictions. He instanced the case of the outbreak of the disease in Alfred County, which had spread over a considerable area in a very short space of time and had jumped the natural barrier offered by the Umzimkulu. He would not be at all surprised to hear that the disease was already smouldering in East Griqualand. The only chance the Cape had was to establish a broad zone along their border, guarded by Europeans. Even now South Africa should grapple with this disease. If it spread as it had done in Natal, it was going to envelop the Cape Colony and Orange River Colony. The farmers of these Colonies would do well to persuade their Governments to make a substantial contribution to help Natal.

Mr. F. B. Smith (Director of Agriculture, Transvaal), said that the experience of Rhodesia had been repeated in the Transvaal, and that it was a matter of method more than of money. They had got rid of the disease by stopping all movements of cattle, and by the fencing of infected areas; it had been proved conclusively enough that a fence would check the course of the disease. They had also done their best to brand all cattle in infected areas. They had a large staff of veterinary surgeons, and these men they regarded as their first line of defence. If they had joint action, let it be action for the whole of South Africa and not for the eradication of the disease in Natal only. There was Swaziland also, which was an infected area.

Mr. P. J. du Toit (Under Secretary for Agriculture, Cape), de-

tailed the steps taken there to keep out the disease. He blamed the Natal Government for not answering their correspondence, and said that Natal should tell the Cape what it was prepared to do in the matter. If Natal was not prepared to do anything, let them say so. Natal should tell them at the Cape whether the latter Colony could come in to stamp out the disease, and they would stamp it out. He felt sure that the Cape was prepared to do a great deal if Natal would only give it the word.

Mr. W. J. Palmer (Director of Agriculture, Orange River Colony) said that the conditions in the Orange River Colony were such that there was no very great danger of the disease crossing the border of that Colony. They had, further, not yet been able to discover the brown tick in the Orange River Colony, which was the chief variety of tick carrying the East Coast Fever germ. Every farmer in his Colony deeply sympathised with the unfortunate farmers of Natal who had suffered from the ravages of the disease. When the disease broke out in the Transvaal they made a regulation to the effect that any cattle straying across the border would be shot, and this had been carried into effect. With regard to Natal a border fence had been erected, and this was properly guarded; whilst another fence was also erected, parallel to this. As far as the O.R.C. was concerned, no weak-kneedness was going to be shown with regard to the disease. If the disease did enter the O.R.C., stamping-out would probably be adopted. He considered it was a matter for all the various Governments to take joint action upon, upon the advice of their veterinary experts. (Hear, hear.) He would deprecate the alarmist statements which had been made to the effect that the disease was bound to sweep through the whole sub-continent. If they sat with folded arms, certainly this would happen, but they must put their energies into fighting the disease, and the spread of that plague certainly could be overcome by joint effort. (Applause.)

Mr. Connacher (Mozambique) said that his Government was willing to co-operate with them in the eradication of the disease. He considered that the Government of German East Africa ought to be asked to co-operate, as that Colony had East Coast Fever on their borders, and the disease would undoubtedly spread south after South Africa itself had cleared of the plague.

Replying, the mover (Mr. Alexander) said it was time that some joint action was taken by the South African Governments; it had been urged upon them in 1904 at the Pretoria Conference, it had been urged upon them since, and it must be urged upon them again now: if united action was not taken by the South African Governments at once, it would later on cost them ten times as much to stamp out the disease as it would now.

The resolution was carried unanimously, and, upon the motion of

Mr. Alexander, the central board suggested was constituted. The delegates elected were as follows:—Messrs. Lee (Cape), Kolbe (O.R.C.), Evans (Natal), Hull (Rhodesia), Connacher (Portuguese East Africa), and Robertson (Transvaal).

Resolutions pointing out the necessity for legislation to provide for the eradication of noxious weeds, for united action on the part of all the S.A. Governments for dealing with tuberculosis, for the prohibition of all speculation of cattle in districts where East Coast Fever prevails, for stringent measures for the eradication of scab, and for united action to prevent the spread of the disease known as "trypanosomiasis," were passed with little discussion. In connection with the last-mentioned resolution, Mr. Watkins-Pitchford (Natal Government Bacteriologist) said that he had already pointed out the danger to the Natal Minister of Agriculture, who had responded by granting him assistance for the purpose of investigation of the disease. Resolutions were also brought forward and carried by the Conference representing to the S.A. Governments the great advantages to be gained by a systematic destruction of ticks, recommending the adoption all over South Africa of a uniform system of branding, and pointing out the need for uniformity in the regulations governing the sale of dairy produce throughout South Africa.

PLANT DISEASES.

Mr. Barrett (Portuguese East Africa) moved:—

"That, in the opinion of this Conference, it is urgently necessary that vigorous measures should be adopted in order to prevent the spreading of plant diseases in South Africa."

By request of the Conference, Mr. Lounsbury (Cape Government Entomologist) addressed the delegates. He said he was against the resolution, as he thought that it might be taken to support the policy of a certain one of the South African Colonies which had adopted methods of protection against plant diseases which were likely to prove detrimental to the interests of the fruit and other industries of other Colonies, those means being, in his opinion, ineffectual for the purposes for which they had been adopted. Mr. Lounsbury then proceeded to describe the rapidity with which fungoid diseases spread through a country, instancing vine anthracnose and phylloxera in Europe, asparagus rust in America, and apple fusicladium in Australia and elsewhere, etc. From his experience, he thought it better that plant diseases should be left to take their own course rather than that Government measures should be adopted which would have the effect of stifling the commerce of the country. It would be different if measures could be formulated that would successfully check the spread of those diseases, but this he said was absolutely impossible, and they would be playing with a double-edged sword in adopting any such measures. He referred also to the

liability of these fruit troubles to develop in transit. Fruit might appear absolutely clean when they were railed, but before they reached their destination disease appeared. In conclusion, he said the passing of the motion before them might easily lead to the imposition of restrictions that would stifle all commerce, not only as regards fruit, but as regards potatoes, oathay, lucerne, and so on.

Mr. C. G. Lee (Cape Colony) considered that the diseases which should be dealt with should be specified, and he accordingly moved the addition of a rider to the effect that the Government experts of the various Colonies decide as to the diseases to be dealt with. As the resolution stood at present, there was a certain amount of vagueness about it.

The addition of this rider was agreed to.

Mr. Pole Evans (Transvaal Government Mycologist) said he had listened with interest, not unmingled with feelings of regret, to the remarks of his colleague, Mr. Lounsbury, on the subject of plant diseases generally, and, while anxious to avoid anything like a controversy, he felt it his duty, in justice to the Colony he represented, and whose policy had been attacked, to draw the attention of the members to the fact that the opinion expressed by Mr. Lounsbury could not be regarded as either accurate or up-to-date, neither were they in harmony with the latest views of science on the subject of plant pathology. Summed up briefly, Mr. Lounsbury's argument amounted to this: The spores of plant diseases were everywhere; they could be carried anyhow; therefore, any attempt to protect the interests of the farming community of the Colony by the exclusion of diseased fruit, vegetables, or plants coming from another State could only be regarded as an unfriendly act, calculated to shake the confidence of the farmers who raised these contaminated crops in the unwillingness of his neighbours to buy such crops, and raise crops of a similar character for themselves. At the same time, and almost in the same breath in which Mr. Lounsbury condemned the policy of the Transvaal, he asserted that the Cape Colony was doing its utmost to exclude pests from oversea. Surely, such an action was difficult to justify, and could hardly be regarded as consistent. If the germs of plant diseases were ubiquitous, and were carried, as Mr. Lounsbury said, by everything and everybody, what good purpose were Mr. Lounsbury's precautions regarding the introduction of oversea pests likely to serve? Was it not probable that the feelings of the oversea growers were likely to be hurt by the unfriendly behaviour of the Cape authorities, and their confidence shaken by the unwillingness of the Cape to receive contaminated fruit and plants from oversea, after the oversea growers had taken so much trouble to raise them? To be perfectly consistent, Mr. Lounsbury should see to it that the stand taken up by this Colony with regard to oversea plants and fruit was identical with the policy which he main-

tained should be adopted by the Transvaal, and which he had so directly attacked. Fortunately, however, the germs of plant diseases, generally speaking, were not universally distributed all over the world, neither were they conveyed over enormous distances by wind, as Mr. Lounsbury appeared to suppose; neither were they lurking everywhere, waiting for the advent of a season favourable for their development before springing into activity. As a matter of fact, many diseases of plants were no more readily spread than diseases of animals, if proper precautions were adopted to hold them in check, and it was, he maintained, the duty of every Agricultural Department to do its utmost to protect the interests of the farming community entrusted to its care by every means in its power, and to abandon no line of defence until it had proved altogether untenable. A policy of drift was on which was only excusable when no other policy was feasible, but its adoption, even then, was no argument in favour of its being taken up by those who found themselves in a more fortunate case, and so far as the Transvaal was concerned, such a policy would be altogether inexcusable. With these preliminary remarks, he would proceed to discuss in detail one or two points in connection with inspection work as carried on in the Transvaal. Mr. Lounsbury, in his address, conveyed the impression that the responsible duty of condemning consignments of imported plants and fruit was entrusted to laymen who were permitted to act upon their own responsibility. If this were so there would be good grounds for complaint, but as the precaution was taken of sending samples from all suspected consignments to Pretoria for examination and report before any action was taken with respect to their destruction or rejection, in this way he maintained that the interests of the consignor received due and reasonable consideration in every instance. That the adoption of such a course was very desirable, in justice to growers and for their own better protection, would be more apparent when he mentioned that for some months past the Cape Colony had been sending forward to the Transvaal large consignments of potatoes infected with Irish potato blight. Although this disease was one of the best known and most important fungus pest of this plant, the Cape authorities themselves failed to recognise it, and specimens of it were sent by them to Pretoria for identification, so that in this connection it was quite conceivable, if they had depended entirely upon the performance of plant inspection duty by laymen, the Transvaal would have been inundated by this disease before its precise character became known. If they accepted Mr. Lounsbury's theory regarding the distribution of the spores of plant diseases by the wind, it was quite conceivable that the average farmer would in all probability have attributed the subsequent inevitable destruction of his potato crop to the malign influence of the atmosphere, instead of to the circumstance that he had used seed contaminated by the mycelium of this parasite, to whose pre-

sence the occurrence of all outbreaks of this disease must be attributed. Further, he wished to point out, before closing his remarks on this subject, and in defence of the action taken by his Colony with regard to certain fungoid diseases not hitherto regarded as being of any great importance, that it was now generally recognised and accepted as an indisputable fact that, under favourable climatic conditions, certain organisms, ordinarily saprophytic in character, might, and did, become actively pathogenic. For this reason, the greatest care must always be exercised in dealing with all diseased shipments of imported plants and fruits, as it was impossible to forecast the probable result of the introduction of such contaminated consignments into fresh fields, and they must therefore regard all such with suspicion, and take every precaution to exclude them till thoroughly satisfied as to their harmless character. (Hear, hear.)

Mr. F. B. Smith (Director of Agriculture of the Transvaal) said Mr. Lounsbury's attack upon the policy of the Transvaal with regard to plant diseases was a most unwarranted one. Surely they owed something to the farmers of the Transvaal? Surely their farmers should be protected against the negligence of the careless farmer? What they wanted to do was to bring the bad up to the level of the good, not level the good down to the bad. (Hear, hear.)

Mr. McDermott (Cape) moved as an amendment:—

"That this Conference, while fully favouring the policy of controlling plant diseases in South Africa by every possible means, urges that any imposition or restriction of commercial and industrial interests of the general community, shall have all reasonable consideration."

This amendment was carried.

RAILWAY MATTERS.

The Hon. W. F. Clayton, M.L.A. (Natal), moved a resolution, which was carried unanimously, to the effect that no changes be made by the various Railway Administrations in the tariffs upon S.A. produce pending the establishment of a general fixed policy as to Customs and railway rates by the Union Parliament, and that in any case the authorities be requested to obtain the opinion of the Agricultural Union before making any such charges.

Upon the motion of Mr. Kolbe (O.R.C.) it was decided to approach the various S.A. Railway Administrations with a view to obtaining reductions in the fares of show judges and live stock attendants proceeding to and from agricultural shows.

A resolution was also carried suggesting that stock or produce that have won first prizes at agricultural shows, under certain conditions, be carried free by rail to and from the central shows, in the event of such shows being established.

AGRICULTURAL SHOW MATTERS.

Mr. C. McG. Johnson (O.R.C.) moved:—

“That at agricultural shows in South Africa it is desired as far as possible to adopt uniform methods of management, including uniform badges, prize cards and a uniform arrangement for the payment of judges’ expenses.”

Mr. Kolbe (O.R.C.) seconded, and the resolution was carried.

Mr. C. McG. Johnson (O.R.C.) moved:—

“That the exhibitors of all horses entered in pure-bred classes at agricultural shows, should supply pedigrees, endorsing names of at least sire and dam on back of entry forms, which pedigrees must have been registered with some recognised stud book.”

The resolution was carried.

ROADS AND BRIDGES.

Mr. Mitchell (Natal) moved:—

“That, in the opinion of this Union, and as an aid to the economic and permanent development of the agricultural industry, it is necessary that all South African Governments be urged to construct branch railways through suitable districts; and to construct good main roads and bridges, suitable for mechanical transport, between farms and railways.”

Mr. Mitchell said that animal transport was coming to be a thing of the past, and mechanical road transport must be adopted to take the place of animals. Animals should be left on the farms to do the ordinary farm work, and all transport be done by mechanical means. For this purpose the roads must be hardened, and cheap but strong bridges constructed. Whenever new railway schemes were being discussed, it should be seriously considered whether the provision of mechanical road transport would not answer the purpose just as well.

Col. Leuchars (Natal) seconded the motion. He said that the mistake in the past had been that the roads of the country had not been properly graded. (Hear, hear.) In many districts, of course, railways or tramways were necessary, but he thought that in the past such railways had been too substantially constructed.

Mr. Pott (Transvaal) moved as an amendment that the words “to construct branch railways through suitable districts, and” be omitted.

The resolution was carried without amendment.

IMPERIAL AGRICULTURAL UNION.

Mr. A. G. Robertson (Transvaal) moved:—

“That the value of the work of this Union would be greatly increased by the adoption of the principle laid down in the President’s circular letter, and that the Executive Committee be instructed to use its best efforts to bring about an amalgamation of Imperial agricultural interests, on the lines suggested in the circular referred to.”

In moving, Mr. Robertson read the circular letter referred to in his resolution. This circular pointed out the advisability, in view of the impending political re-constitution of South Africa, of the South African Inter-Colonial Agricultural Union's approaching, at the earliest opportunity, other British Colonies with a view to the formation of a Union which would be representative of British Colonial agricultural interests throughout the Empire. Such a Union could then, together with a similarly constituted Union in the British Isles, join, as one body, the International Agricultural Union whose headquarters were in Rome. He suggested that Australia, New Zealand, British Africa, and Canada be approached in the first instance, and, later on, perhaps the West Indies and other Colonies.

Mr. C. G. Lee (Cape) seconded, and the resolution was carried unanimously.

POULTRY FARMING

Resolutions asking the Governments of South Africa to give every possible encouragement with a view to fostering the poultry industry and to institute an inter-Colonial egg-laying competition, were passed, upon the motion of Mr. A. Basden (Transvaal)

MARKET MATTERS.

The following resolutions on market questions were carried:—

(1) "That, in connection with all municipal markets, provision should be made for the consignment of agricultural produce direct to the Market Master, for sale, in accordance with instructions from the consignors, and also for the payment of the proceeds of such sales, less commission charges to the consignors."

(2) "That this Union instruct its Executive Committee to urge upon the various South African Governments, and upon all municipal authorities, the necessity for compelling all market agents to be licensed, and to provide satisfactory security for the due payment of proceeds of the sale of products, etc., forwarded to them by farmers for disposal"—with rider to the effect that the Executive Committee should take strong measures to enforce and carry out the resolution."

(3) "That this Conference considers that it is desirable that, upon all governing bodies controlling municipal markets, provision should be made for farmers to be directly represented."

AGRICULTURAL IMPLEMENTS.

Upon the motion of Mr. Hosking (Natal) the following resolution was carried:—

"That this Conference take steps to induce the manufacturers of agricultural implements to carefully study the requirements of the South African farmers, with a view to the manufacturing and sale of implements in this country."

FARM TELEPHONES.

A resolution urging the Union Government to make provision whereby a system of farm telephones shall be established as widely as possible, was carried, upon the motion of Mr. Baily (Transvaal).

S.A. NATIONAL UNION.

It was resolved, upon the motion of Mr. Van Alphen (Transvaal), that, seeing that the objects of the S.A. National Union are similar in their character to those of the Inter-Colonial Agricultural Union, earnest efforts should be made to secure mutual co-operation for the achievement of those objects.

CONSTITUTION OF THE UNION.

The report of the committee appointed to go into the matter of the amendment of the constitution of the Agricultural Union was read by the Secretary. The report showed that it had been decided by the committee to recommend the formation of a central committee to keep the objects of the Union before the different Governments of South Africa and the public generally. It was also thought that this committee should remain in existence until the next Conference of the Union, in which time they would consider any alterations in the constitution required, and report to the next Conference.

The report was adopted.

NATIVE LABOUR BUREAU.

Mr. Hull (Rhodesia) moved, and it was resolved:—

That, with a view to the development of agricultural industry, and to the scarcity of Native labour, it is desirable that steps be taken for the establishment of a Labour Bureau, from which labour could be drawn by farmers."

LAND SETTLEMENT.

Mr. Hosking (Natal) moved:—

"This Union is of opinion that closer settlement is essential to the true agricultural progress of South Africa, and therefore urges upon all South African Governments the desirability of purchasing or appropriating land, on reasonable terms, for the purpose of disposing of it to suitable settlers, by lease, or otherwise"

Mr. F. W. Evans (Natal) seconded the resolution. He said that if South Africa was ever to compete in the markets of the world, they must have closer settlement, and they must also have every facility for the sending of their produce to the markets. Roads could not be improved and railways could not be constructed without money; this money must be provided by the State, and the State could not provide it if there were not a sufficient number of people in the country to contribute

by taxation. They also had a duty to the Empire to think of. In South Africa they had the land; in England they had the people, who must be fed, and who must be given inducements to emigrate. As an instance of what could be done, he pointed out that in Australia men were making handsome livings on a hundred acres of paspalum, and paspalum did well over large areas in Natal. With regard to expropriation, he said that it was meant to apply to the land which was not being used, and which was being held in order that the owners might benefit by the exertions of others. He wished to correct the mistaken idea that many farmers had with regard to the meaning of expropriation, pointing out that land that is not being properly occupied would be purchased by Government at a reasonable price.

Mr. Mallison (Cape) said he did not think the time had yet come in the history of South Africa when it was necessary for them to ask the Government to adopt expropriation. He was opposed altogether to the idea of expropriation. A farmer ought not to be obliged to sell land if he did not wish to. He further pointed out that in New South Wales it had been admitted by the Minister of Agriculture there himself that expropriation had proved a failure. Unsuitable land was often expropriated, and land that was too far from the railways to admit of being profitably farmed. He moved as an amendment:—

“That this Union is of opinion that closer settlement is essential to the true agricultural progress of South Africa, and therefore urges upon all South African Governments the desirability of purchasing suitable land for the purpose of disposing of it to suitable settlers by lease or otherwise.”

Rev. Mr. Scott (Natal) also expressed himself in opposition to the principle of expropriation. There was no one who desired more than he did to see South Africa settled with a large white population, but this was not the way to go about getting the population. He said, too, that close settlement was not suitable for Natal; the land of that Colony was too poor. No white man could keep a family on a smaller acreage than three or four thousand acres.

Mr. C. G. Lee (Cape Colony) spoke in favour of closer settlement, but as to the matter of expropriation, they must go very carefully. He considered that if they asked for expropriation at the present time they would be doing themselves harm. (Hear, hear.) He thought that they must wait until closer settlement had been actually proved a success.

Mr. Mitchell (Natal) said the question turned upon the matter of locality; how far the locality was from the railway, what the means of communication were, and what the land was like. As regards expropriation, he said that where suitable land could be obtained in the open market, they had no need for expropriation, but in such a Colony as

Natal, where all the best land that was not in use was locked up, belonging to people living in the Old Country who were waiting until their land went up in value before they put it in the market, at the same time that there were prospective settlers looking for land, expropriation was necessary.

Mr. D. M. Brown, M.L.C. (Cape) also spoke in favour of closer settlement and expropriation. As Mr. Mitchell had said, it was a matter of locality and means of communication.

Mr. Nicholson said that if expropriation was desirable in Natal, let Natal adopt it by all means, but the conditions were vastly different in the Transvaal, and he accordingly thought that they should not pass such a sweeping resolution as that which was before the Conference.

Mr. Hosking withdrew his motion in favour of the amendment, which now became the original resolution, and was carried.

AGRICULTURAL STATISTICS.

Mr. Marwick (Natal) moved:—

“This Union is of opinion that, with a view to the constantly increasing production of grain in South Africa, steps should be taken to provide reliable statistics in respect of our main crops.”

Mr. P. J. Du Toit (Cape Under Secretary for Agriculture) read an interesting paper on agricultural statistics, which was published in the last issue of the *Journal*.

Upon the motion of Mr. Lee (Cape) a rider was added, urging the Governments and Administrations of British South Africa to appoint a representative to a special conference to devise a uniform system, and in this form the resolution was carried.

S.A. JUDGES' UNION.

Mr. Poultney (Transvaal) moved a resolution to the effect that the Union establish a South African Association of Judges in connection with the Union. He said they needed an association of judges comprising the best men from all over South Africa.

Mr. C. G. Lee (Cape) seconded.

Mr. E. W. Evans (Natal) moved as an amendment:—

“That this Union recommends each agricultural union for form a judges' association within its own province or territory or uniform lines, and with uniform rules, with the intention of combining together to ultimately affiliate with this Union.”

This amendment was carried.

OTHER RESOLUTIONS.

The following resolutions were carried, with little or no discussion:

S.A. NATIONAL EXHIBITION.

“That this Congress agrees to support and assist as far as possible

the exhibition of South African products and manufactures (including other articles which are foreign to this country in their production and manufacture) to be held in Capetown during the first session of the South African Union Parliament" [Moved by Mr. McDermott (Cape)].

THE C.S.A.R. AND LIVE STOCK.

"That the C.S.A.R. be requested to supply adequate accommodation for off-loading live stock at Johannesburg." [Moved by Mr. Hunt (Transvaal)].

WILD OSTRICHES.

"That, in view of the importance of the ostrich industry and the absence of reliable data concerning the wild birds of Africa, the Governments of South Africa be requested to collect data regarding such wild birds, and in addition at least twelve sets of feathers of wild birds be collected from each State in Africa and a report on the same be obtained from farmers and dealers." [Moved by Mr. Bailly (Transvaal)].

DAMMING OF SLUITS.

"That this Union would strongly urge upon the farmers of South Africa to do their utmost to dam the sluits on their farms." [Moved by Mr. Mitchell (Natal) as an amendment to original resolution moved by Mr. Van Zyl (Cape)].

DESTRUCTION OF JACKALS.

"That this Conference brings to the notice of the several Governments the necessity for immediate action in regard to the jackal pest, and the desirability of disseminating information as to the best means of combating this scourge." [Moved by Rev. Mr. Scott (Natal) as an amendment to original resolution moved by Mr. Van Zyl (Cape)].

CONCLUSION OF PROCEEDINGS.

A hearty vote of thanks was accorded the President of the Union (Mr. Robertson); and votes of thanks were also passed to the various Departments of Agriculture of South Africa, for their help and sympathy, to the gentlemen who had read papers to the delegates on various subjects at the Conference, to the Mayor and Burgesses of Durban, and the Durban Club for their hospitality during the stay of the delegates in Durban, the outgoing Secretary (Mr. Nicholson), the press representatives present, the members of the Natal Agricultural Union, who had helped to make the visit of the delegates from the other Colonies a success, and to the President and Secretary of the Natal Agricultural Union for their labours in the same direction.

The proceedings were brought to a conclusion with cheers for the outgoing and incoming Presidents and Secretaries, and a short valedictory address by the President.

OFFICE-BEARERS, 1909-10.

The following are the office-bearers of the Union for the ensuing year:—*President*: Mr. E. W. Evans (Natal). *Vice-Presidents*: The Presidents of the various Colonial Unions, Mr. P. W. Michan, M.L.A. (Cape), and Rev. Jas. Scott (Natal). *Secretary*: Mr. D. M. Eadie. *Executive Committee*: Natal: Messrs. Mitchell, Marwick and Leuchars; Mozambique: His Excellency Governor Cardoza, and Messrs. Connacher and Barrett; Cape Colony: Messrs. C. E. Evans, Malleson and Edmeades; Transvaal: Messrs. Hunt, Van Alphen and Pott; Rhodesia: Messrs. R. A. Fletcher, M.L.C., Cripps and Jobling.

It was decided to hold the next Conference at Capetown, the date to be left to the Executive Committee to fix.

Consumption of Maize.

WHAT NATAL FARMERS REQUIRE ANNUALLY.

As announced in a recent issue of the *Journal*, we have for some months past been making inquiries as to the quantities of maize consumed on farms in Natal. Special forms were printed and sent to every farmer in the country, with a request that they be filled in and returned as early as possible. These forms are now all in, and we are accordingly now able to publish the results in detail of our inquiry. Special care has been taken in the collection and compilation of these figures, and the results may be taken as approximately correct.

The following is the statement which has been compiled, totals being given for each of the Magisterial Divisions of the Colony:—

CONSUMPTION OF MAIZE ON NATAL FARMS.

NATAL.—Coast:	Muids.
Lower Umzimkulu	6,800
Alexandra	10,400
Umlazi	9,000
Inanda	23,200
Lower Tugela	24,250
Total	73,650
 <i>Midland:</i>	
Impendhle	4,950
Alfred	4,250
Ixopo	16,000

Earthnuts and Their Culture.

By W. R. BEATTIE,

Assistant Horticulturist, U.S. Bureau of Plant Industry.

(Continued from page 367.)

VARIETIES OF EARTHNUTS.

THERE are not more than five or six distinct varieties of the earthnut grown in the United States, but these few varieties represent at least three separate types. By classifying the varieties of earthnuts according to types we have first the large-podded, or Jumbo, nuts and the small-podded nuts. These types are sub-divided into bunch and running nuts. Pods and nuts of the more important commercial varieties are shown in an accompanying illustration.

Those varieties having a bunch habit of growth are most generally grown, owing to the fact that they may be planted closer together than the running varieties. The bunch varieties are also more easily cultivated and harvested than the runners.

VARIETIES FOR MARKETING.

For vending purposes, where the nuts are roasted and sold from the first stands, the large-podded varieties, including Virginia Bunch and Virginia Runner, are in greatest demand, although considerable quantities of Spanish and North Carolina are used for this purpose. For shelled nuts the smaller nuts of the large-podded stock are employed; also the greater part of the crop of Spanish, North Carolina, and Tennessee Red varieties. A large percentage of stock that is shelled is of the variety known as Spanish.

VARIETIES FOR STOCK FEEDING.

When earthnuts are grown exclusively for feeding purposes the Spanish is undoubtedly to be preferred. If it is desired to market the high-grade portion of the crop and feed the remainder, the question of variety to be grown will depend largely upon locality. Many growers throughout the earthnut area follow the practice of planting several acres of Spanish earthnuts and disposing of all of the better-grade nuts to some factory for shelling purposes, the vines and poorly filled pods being fed to the farm animals. The Spanish earthnut can be grown under a much broader range of conditions than can the large-podded sorts, and should be employed where the season is short.

This variety also produces a heavy yield of vine and is desirable for forage purposes. The Tennessee Red is very similar to the Spanish in habit of growth and is desirable for stock feeding, but as this variety does not sell readily upon the market it is not generally recommended.

THE USES OF THE EARTHNUT.

To most persons the earthnut suggests only the article as it appears for sale whole or shelled and salted, but during recent years the uses of earthnuts have become numerous, and include a wide range of utility. The demand for earthnuts for use in the manufacture of food preparations is constantly increasing. By-products of the earthnut are now being employed extensively in the manufacture of feeds for farm stock and dairy cows, and the plant is being largely utilised as forage and as a soil renovator.

THE USES OF EARTHNUT BY-PRODUCTS AS FOOD FOR LIVE STOCK.

In the factories where earthnuts are cleaned, shelled, and graded ready for the market there is always a certain percentage of cleanings and inferior stock that can readily be turned into stock foods. The outside shell, or hull, of the earthnut is rich in food materials but is extremely difficult to reduce to a condition in which it can be fed. In large cleaning factories the shells are generally used as fuel, and the ash resulting therefrom is valuable as a fertiliser, often containing as high as 3 per cent. of phosphoric acid, 9 per cent. of potash, and 6 per cent. of lime.

The thin brown covering of the nuts has a feeding value almost equal to that of wheat bran. These hulls are especially desirable for mixing with the smaller particles of broken nuts for stock feeding. In large factories where earthnuts are prepared for the manufacture of earthnut butter and similar preparations the waste in the form of small particles of the meats and the germs is considerable and is sold to farmers for feeding purposes. In some cases the waste is mixed with a portion of the hulls and finely ground or chopped before leaving the factory. Earthnut hulls can not readily be ground by means of a burr mill, but require some form of chopping or shredding process.

Broken nuts and germs are used largely as a food for hogs, and both should be fed in moderation and in combination with some grain, as the earthnut feed by itself will produce a hog having soft fat and inferior meat. The famous Smithfield hams and bacon come from hogs that are partially fed on earthnuts, the practice being to turn the hogs into the earthnut fields after the crop has been gathered and allow them to glean the pods that were lost in harvesting. The principal objection to the use of earthnut by-products as stock feeds is their tendency to become rancid very quickly. The germs can make good earthnut butter

for home use. The earthnuts may be roasted before or after shelling, but in either case the oven should be only moderately hot and the earthnuts should be stirred frequently. After roasting, rub off the skins and screen out the small germs, or hearts. In grinding, use the finest plate on the grinder and screw up the tension until the crank will be quite hard to turn. If the pulp is too coarse after one grinding it may be run through a second time. It will not be necessary to add anything but a little salt to the butter, but if desirable the butter may be thinned by the addition of a little olive oil.

THE IMPORTANCE OF THE EARTHNUT AS A FARM CROP.

In sections where the soil and climate are suitable the earthnut is rapidly becoming a crop of general farm importance. In the Southern States of America earthnuts can be grown under a wide range of conditions, and the product can be used for several purposes. Earthnuts are valuable as a substitute for cowpeas, especially on certain soils that are not adapted to the growing of the cowpea. In many sections where the clovers and other soil-renovating crops will not withstand the heat and drought of the summer months, the earthnut will thrive and make an excellent growth. A crop of earthnuts for forage can often be grown after the removal of oats or some other spring crop, and although they may be badly overgrown by crab-grass, the tops may be mown with the grass for hay, and the hogs turned in to root out the nuts.

Throughout Georgia and the surrounding Gulf Coast States the earthnut is extensively used for planting in the alleys between the rows of mealies. The earthnuts are planted at the time the maize is given the last working, and are allowed to grow as a catch crop among the mealies. After the maize is pulled, cattle are turned in to eat the fodder and the earthnut tops. Following the cattle the land is pastured by hogs to clean up everything that remains. In this way most of the nitrogen stored by the earthnut roots is left in the soil. Earthnuts can be planted between rows of cotton in the same manner.

THE VALUE OF EARTHNUT HAY FOR FEEDING PURPOSES.

The tops of the earthnut plant when cut and cured in the same manner as other legumes will produce a hay that is almost equal in feeding value to the best clover hay. By planting the Spanish earthnut in rows from 24 to 30 inches apart and quite closely in the row and by giving the crop about two cultivations, it is possible to produce from one to two tons of hay to the acre. After the hay is removed the pods can be turned out by means of a plough, cured, and stored for winter feeding, or hogs may be turned in to gather the crop. The following table shows the comparative value of earthnut hay.

TABLE I.—*Comparative Analysis of Earthnut Hay and other Hays.*

Dry Matter.				Protein.	Carbohy- drates.	Fats.
				<i>Per Cent.</i>	<i>Per Cent.</i>	<i>Per Cent.</i>
Earthnut hay	...	...	...	11.75	46.95	1.84
Earthnut, entire plant	...	...	...	13.48	36.28	15.06
Clover hay	...	...	...	12.84	48.31	2.11
Timothy hay	...	...	...	7.17	52.94	1.97
Cowpea hay	...	...	...	19.72	45.15	4.04
Lucerne hay	...	...	...	16.48	42.62	2.03

Earthnut straw, consisting of the entire vine after the saleable nuts have been removed, has a somewhat higher feeding value than the tops alone, due to the fact that many of the inferior pods are left in the straw. Earthnut straw is, however, not so bright or palatable for feeding as are the earthnut tops when cut and cured, especially for hay.

THE VALUE OF THE ENTIRE EARTHNUT PLANT AS FORAGE.

Throughout that portion of the Southern States of America where field maize does not yield a satisfactory crop, the place of maize for feeding to animals may be largely taken by the earthnut. On some ranches where a large number of work animals are maintained the Spanish earthnut, including the entire plant, is practically the only feed used.

The earthnut vines and nuts when chopped or ground together form almost a balanced ration for a dairy cow. The following table will give some idea of the comparative value of earthnut products and other feeding stuffs.

TABLE II.—*Comparative Analysis of Earthnuts and other Feeding Materials.*

Dry Matter.				Protein.	Carbohy- drates.	Fats.
				<i>Per Cent.</i>	<i>Per Cent.</i>	<i>Per Cent.</i>
Ground maize and oats	...	...	...	9.6	71.9	4.4
Mealie meal	...	...	...	9.2	68.7	3.8
Wheat bran	...	...	...	15.4	60.4	4.0
Cotton seed meal	...	...	...	42.3	23.6	13.1
Earthnut kernels	...	...	...	26.6	16.7	42.0
Earthnut vines	...	...	...	10.0	42.0	3.6
Clover hay	...	...	...	12.4	33.8	4.5
Lucerne	...	...	...	14.3	42.7	2.2
Earthnut, whole plant	...	...	...	18.4	40.1	21.5

THE USE OF EARTHNUTS FOR FATTENING HOGS.

As already suggested, the earthnut is a valuable feed for use in preparing hogs for market, the usual custom being to turn the hogs into the

earthnut fields and allow them to glean whatever is left after harvesting. In some sections earthnuts are being grown primarily for feeding to hogs. Poorly filled nuts, broken peas, the germs, and waste products generally are fed to hogs during the earlier part of the fattening period. A hog that is fattened exclusively on earthnuts will not yield a desirable class of meat or lard, as the meat will lack firmness and the lard be soft and oily. Toward the end of the fattening period the hog should be fed exclusively on mealies. Hogs will eat considerable of the earthnut tops when pastured on them, and the plan of dividing the field into small areas by portable fences and allowing the hogs to gather the peas is perhaps the most economical.

METHODS OF HANDLING AND CURING EARTHNUTS FOR FORAGE.

Where the entire earthnut plant is to be stored and used for feeding to stock the work of curing and caring for the vines should be very much the same as in curing cowpea hay, although the earthnut vines will cure more rapidly than those of the cowpea. The vines are ploughed from the soil or lifted by means of a potato digger, and after being allowed to lie exposed for a few hours are raked into very small windrows by means of an ordinary hay rake. After partially drying in the windrows the vines are put up in small shocks, preferably around poles. The main object in the handling of earthnut vines for forage will be to get the stems and peas properly cured without losing the leaves, and in order to do this it is necessary to keep them in bunches and to dry them gradually. After the vines are sufficiently dry they may be stacked around a pole or hauled to the barn and stored in the hay mow. Where the stacking method is employed the stacks should be rather small, say not over a ton each.

Earthnut vines for forage purposes can be handled in the same way as those of the cowpea and yield a very desirable class of forage. Persons who have used the earthnut exclusively for feeding purposes claim that they have had no difficulty in feeding it to all kinds of work animals, even driving horses. It is well, however, to feed only a part ration of earthnut vines at first and to observe the animals until they become accustomed to this form of diet. Under ordinary circumstances the plant is fed without removing the nuts, but it may be well in some cases to pick the earthnuts from the vines and grind them, shell and all, and then feed as a meal with the vines.

The farmer who interests himself in clover and lucerne is the one who is now looking so prosperous.

Maize Export.

SOME INTERESTING FIGURES.

THE following statement, showing the numbers of bags of maize shipped overseas from Port Natal during the nine months ended September 30th, 1909, has been supplied to us by the Port Captain, and is here published as it will probably prove of interest to many of our readers. The figures include shipments to Cape ports:—

EXPORT OF MAIZE.

Statement showing number of Bags of Maize exported through Port Natal under Grade Certificate during nine months ended 30th September, 1909, from Natal, Orange River Colony and Transvaal Farms.

Description.				Produce of Natal.	Produce of O.R.C.	Produce of Transvaal.	Total.
<i>White Flat:</i>				Bags.	Bags.	Bags.	Bags.
Choice	...	...	...	72,190	6,611	4,155	82,956
F.A.Q.	...	...	...	50,608	114,839	59,746	225,193
Below Grade	...	...	...	—	21	11	32
Total	...	...	...	122,798	121,471	63,912	308,181
<i>White Round:</i>				—	100	—	100
Choice	...	...	...	—	36,201	3,926	40,127
F.A.Q.	...	...	...	—	101	—	101
Below Grade	...	...	...	—	—	—	—
Total	...	...	...	—	36,402	3,926	40,328
<i>Yellow Flat:</i>				1,293	377	200	1,870
Choice	...	...	...	4,698	6,396	1,348	12,442
F.A.Q.	...	...	...	—	—	—	—
Below Grade	...	...	...	—	—	—	—
Total	...	...	...	5,991	6,773	1,548	14,312
<i>Yellow Round:</i>				396	17,696	1,484	19,576
Choice	...	...	...	820	139,932	8,659	149,411
F.A.Q.	...	...	...	—	—	—	—
Below Grade	...	...	...	—	—	—	—
Total	...	...	...	1,216	157,628	10,143	168,987
<i>Mixed:</i>				1,904	1,313	4,074	7,291
Choice	...	...	...	64	40,772	443	41,279
F.A.Q.	...	...	...	—	400	3	403
Below Grade	...	...	...	—	—	—	—
Total	...	...	...	1,968	42,485	4,520	48,973
GRAND TOTAL	...	...	...	131,973	364,759	84,049	580,781

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

W. C. MITCHELL, Hon. Secretary, Cedara.

GOOD work was done at the general meeting held at the Natal Creamery on Wednesday, October 13th. The statement of accounts, etc., reflected a membership of 57, with a cash balance of over £6. This, taking into account the short time the Association has been started, was considered highly satisfactory. Rules were passed; the proposed show received considerable discussion, and also the highly important subject of foul brood legislation, whilst the equally important one of marketing honey also received attention. These and other matters will be dealt with under their respective heads in these pages. It is hoped that printed copies of the rules will be in the hands of all members shortly. These were drafted by the committee, presented to the general meeting, and duly passed.

* * *

All members present at the meeting reported that their bees were doing well. Let us hope that this is a good omen for the ensuing season.

* * *

Miss Pullinger, of Malvern, who is shortly leaving the Colony, is disposing of her apiary. This is a good opportunity for securing some strong colonies at a reasonable price.

* * *

It is proposed to adopt an Association honey label. Mr. Fuller and the Secretary have been appointed as a sub-committee to deal with the matter, and they will be pleased to receive designs and suggestions from members who will be so good as to submit same.

* * *

All South African bee-keepers will be pleased to hear that the 100 queens that were to have arrived for the Cape Government have been stopped. Mr. Attridge writes to say the importation has fallen through. The news only reaches me just in time for insertion in these notes, so I will be brief—and American—Brother bee-keepers shake.

FIRST ANNUAL SHOW.

It has been arranged to hold a show sometime in either April or June, the exact date to be announced later. It is hoped that every member who can possibly stage an exhibit will do so. The following prize-list and regulations are published for the information of members, but it must be distinctly understood that the committee reserves the right to amend these in accordance with funds in hand or should any other circumstances necessitate. All judging will be done on a scale of points fixed by the Association. Country exhibitors can have their exhibits staged for them by the committee, and show stands will be protected with netting to protect the exhibits from damage. Any member wishing to dispose of his exhibit can have same sold by auction; the Association will attend to this, charging a commission of 10 per cent.

Class 1.—Exhibit of hives and appliances, to occupy not more than 30 square feet: 1st, 20s.; 2nd, 10s.

Class 2.—Any Colonial-made appliance, other than hives, price to be stated: 1st, 20s.; 2nd, 10s.

Class 3.—Beeswax, not less than 3 lb.: 1st, 10s.; 2nd, 5s.; 3rd, 2s. 6d.

Class 4.—Foundation comb, Colonial-made, not less than 5 lb.: 1st, 10s.; 2nd, 5s.

Class 5.—Comb honey, 12 section: 1st, 10s.; 2nd, 5s.; 3rd, 2s. 6d.

Class 6.—Comb honey, 3 shallow frames: 1st, 10s.; 2nd, 5s.; 3rd, 2s. 6d.

Class 7.—Liquid honey, 12 one-pound bottles: 1st, 10s.; 2nd, 5s.; 3rd, 2s. 6d.

Class 8.—Granulated honey, 12 pounds: 1st, 10s.; 2nd, 5s.; 3rd, 2s. 6d.

Class 9.—Observatory hive, with bees: 1st, 15s.

Class 10.—Exhibit of honey, wax, etc., staged for effect, to occupy a space of 3 feet by 3 feet: 1st, 15s.; 2nd, 10s.; 3rd, 5s.

Class 11.—Educational exhibit.

* * *

RULES AND BYE-LAWS.

The following rules were passed at the meeting on the 13th:—

1. The Association shall be called the Natal Bee-Keepers' Association.

2. The aims and objects of the Association shall be the encouragement, improvement and advancement of bee culture in and throughout Natal; to educate, assist and bring together bee-keepers and work for the humane and scientific treatment of the honey bee; to supply the market with honey produced in Natal.

3. A general meeting shall be called at least once annually for the election of officers, presentation of report and balance-sheet and the transaction of any other business. The meeting shall be held in Maritzburg during Show Week. The Secretary shall give each member fourteen days' notice of such meeting.

4. The officers of the Association shall consist of a President, Vice-Presidents, Auditor, Secretary and Treasurer and six other members of committee, who shall have power to add to their number as found necessary. At all committee meetings three shall form a quorum. Any member of committee absenting himself from three consecutive meetings shall, at the discretion of the committee, cease to be a member of same.

5. The Secretary shall be authorised to call a meeting of committee whenever business shall require it.

6. A special general meeting of members shall be called by the Secretary whenever any five members of the Association shall, by notice in writing stating the reason for their request, require him to do so. The Secretary shall give fourteen days' notice of such meeting, stating the object for which it is called.

7. The committee shall have power to make and amend bye-laws, provided always that such bye-laws be not in conflict with rules made at a general meeting.

8. The committee shall have power to refuse membership to the Association and to remove from the list of members the name of any person whose conduct, in their opinion, has been, or is likely to be, injurious to the Association. Such power shall only be exercised by a three-fourths majority of the committee.

9. The subscription to the Association shall be 2s. 6d. yearly, payable in advance, and shall become due on the first of June in each year. This does not include delivery of the official organ of the Association.

10. All official notices of the Association shall be published in the official organs of the Association.

11. Every member shall be supplied with a copy of the rules and bye-laws, and any member not conforming thereto is liable to be dealt with under Rule 8 hereof.

12. These rules and regulations of the Natal Bee-Keepers' Association may be altered, added to or modified at any general meeting, the member or members wishing to propose such alteration to give at least seven days' clear notice of same to the Secretary in writing.

Bye-Laws.

(1) Association honey labels can be obtained from the contractors, Messrs. @ per 100.

(2) No member shall sell honey at a lower price than 1s. per bottle for extracted and 1s. per section for comb honey, weighing one pound

and 12 ozs. (minimum) respectively. The above prices to be altered by the committee as found necessary, of which notice will be given to members.

(3) The official organs of the Association shall be the *Natal Agricultural Journal* and the *South African Poultry Journal*.

* * *

In explanation of Bye-law 1, it should be stated that when a design for an Association label has been fixed tenders will be called for to supply these to members in lots of 100 and over. It is thus hoped to secure a label which will, in addition to securing a more uniform package for the produce of members, be at the same time neat, cheap and attractive.

* * *

Several requests have been received from members for information regarding the Isle of Wight bee disease. I hope to be able to publish a short digest in next issue of a description of the disease as furnished by the *Journal* of the British Board of Agriculture.

* * *

Owing to lack of space I am also unable to furnish in this issue a first prize essay on the subject of bees and bee-keeping written by Miss Isobel Kinsman, of the Girls' Government School, Ladysmith. This essay was written subsequent to a lecture delivered on the subject recently, and the writer is to be congratulated on her grasp of the subject as reflected by her work.

DISTRICT NOTES.

Camperdown.—Mr. J. W. Gavin reports bees in good shape, although no appreciable amount of nectar is so far being secured. Yellow and white pollen is being gathered from wattle and wild flowers.

Deepdale.—Mr. F. H. Harrington reports queens active, but no swarms during September. Nectar being gleaned from bottle brush and fruit bloom. Yellow pollen from wild daisies.

New Hanover.—Mr. W. T. Hibbert reports hives full of bees and foundation in extracting frames being drawn out; no swarms to the end of September. Light honey being gathered from wattle (?), syringa, and fruit bloom, whilst yellow to greenish yellow pollen is being gathered from chick-weed and syringa. Strong winds have adversely affected the bees.

Transferring.

By APIS MELLIFERA.

WHEN any person undertakes to do a thing that such an one has neither had the good fortune to witness an experienced operator perform, nor to read a description of just how it should be accomplished, in fact, been unable to gain any information whatever, I am under the impression that very soon little knacks will be developed, and after further experience perhaps abandoned for better ones, until the individual has developed a system which, in his or her opinion, is the best. Such was my position when I commenced bee-keeping, and the recollection of the many difficulties I then experienced has induced me to write a description of my method of transferring from wood and iron buildings.

First we will collect our tools, etc., as if for a journey of, say, fifty miles, thus making it imperative to have the bees enclosed in a bee-tight box.

Tools.—Veil, smoker, jimmy, hammer, gloves, cold chisel, knife, screwdriver, scissors, sacks, punch, tennon saw, chisels, nailclaw.

A box to enclose the bees can be made of two milk boxes; choose two good ones. Make them into one by knocking the tops and bottoms off and then nail the two together with two battens on each side and two on the ends, using nails sufficiently long to enable you to clinch them on the inside. Now make two frames on which you will nail perforated zinc. This can be made by cutting strips off the tops and bottoms, choosing the best, and not forgetting to strengthen it with at least two cross pieces. This frame can be made exactly the correct size by the inexperienced by nailing them (that is the strips) on to the box, and then nailing the zinc to the strips while in position. If you use 1 inch nails, and cut the heads off, they can be slipped through the perforations and are easily removed after you have tacked the zinc on to the frame. This will give you a perfectly fitting removable frame with the zinc attached. The job is not complete until you have made the box absolutely bee-proof. You may also require a dozen pieces of deal, 1 inch by 1 inch and a foot long. Don't try a single box, as you may be fortunate enough to secure a large swarm on a scorching hot day and suffocate the lot. Almost the last job of transferring I did, I secured six fine lots that almost filled the single boxes I was foolish enough to take with me, and when I opened them there were not enough live ones to make one colony! A loose piece of perforated zinc, about the same size as the one you have had to cut for the box, and a few nails of various sizes will about meet requirements.

I will now describe as nearly as possible the conditions of the lots

referred to above. No. 1 was the side of the building; to remove the sheet of iron I should have had to remove the fascia board, which was about 6 inches wide, with the guttering on it. To remove the guttering would require breaking the parts asunder that are always soldered together; this I have never yet done; I prefer to draw the screw with the jimmy, large hammer and cold chisel. With a very little practice you will soon learn to get the points of the jimmy under the screw, hammering until the claw has caught firmly. Now place the cold chisel in the corrugation and you can hammer as much as you like and do no damage to the iron, which is no small consideration. I usually remove the lower and middle screws from the sheets of iron and then smoke a little before carefully pulling it out. I pull it just sufficient to enable me to insert the tube of my smoker, and smoke gently to drive the bees off the combs.

I prefer when purchasing a smoker to remove the upper portion and have a cap about 2 inches deep with a $\frac{1}{2}$ inch tube about 6 inches long soldered near the top; a perfect cloud of smoke from the right kind of fuel can be blown out. If the entrances to your hives are sufficiently deep it can be inserted right into the hives under the bees, so that there is no chance of the bees blowing it out as fast as you puff it in.

All the bees should be driven off the combs and made to cluster at the side of them; now gently draw out the sheet of iron as far as possible and keep it open with your screwdriver, if it is long enough, or failing this obtain a stick for the purpose. When removing the combs avoid scattering the bees all over the ground or you may accidentally tread on the queen, in which case you may expect trouble.

If only the fascia board be present without the guttering, take one of the pieces of deal mentioned, sharpen it at one end and drive it under the fascia board until there is only about three inches of it projecting; lift it with a screwdriver and drive another under the first piece, and then another in the same way until the board is forced loose. This should be done in two or three places to lift the whole board. If the board runs the whole length of the side of the house, cut it with your tennon saw. In this case it is necessary to remove only the screws so that you can take the iron off.

The six colonies were all in the one house, one on one side, three at the back, one on the other side and one in front. The iron and combs I removed from all before attempting to secure the bees, which, in the meantime, are allowed to cluster nicely, which is a great factor in enabling you to secure them with ease.

The one or two articles I have read on transferring advocate removing the screws with a screwdriver to avoid making any noise, and then obtain the bees and combs at one operation. I do not practice this plan for many reasons. The first is that all the screws but the last one, or

perhaps only one, are removed with ease, but that one, if you persist in the screwdriver method, will drive you fair crazy, and even then won't budge. This happened every time with me, and now I never use the screwdriver at all; start right off with the jimmy is now my method. The noise made while hammering drives the bees off to one side, making it a certainty that the queen is off the combs, which prevents her getting accidentally trodden on, as mentioned. That is the second reason, and a very important one in my estimation.

In cutting the combs I wear gloves and can then let them fall flat on the palms of my hands. In some cases where there are so many colonies in one building they will start robbing, in which case a canvas veil and a sting-proof suit will be absolutely necessary to get the job over as quickly as possible, as they sting like demons when once they have commenced robbing, and are not likely to quit until they have cleaned all the honey up.

After having removed all the combs I return to the lot commenced with, which should be found nicely clustered around the queen. Get the loose piece of perforated zinc which is to be pushed under the cluster, put the left-hand glove on, and obtain something which will enable you to drop the whole cluster into the zinc beneath. See that you have the zinc in such a position that no bees will drop over the edges of it. It is advisable to have someone to hold one of your boxes in such a position that after quickly withdrawing the zinc and bees you can shake them inside. They should be shaken with a sudden jerking back of the zinc that will shake practically all of the bees off, so that should they be inclined to take wing the zinc can be placed over the box until they commence crawling, after which you may safely remove it. The bees should not be dropped into the zinc until you are satisfied that you will secure almost all of them. To a great extent your success in transferring bees will depend on your being certain that you will secure the queen in the first lot of clustering bees you cut into the zinc, for after that they are again scattered. From the time I commence operations I search for the queen; should a few bees happen to fall I look amongst them to ascertain that the queen has not fallen; every comb that is cut is carefully examined in case the queen should be found on it. It is absolutely imperative that "Her Majesty" be found, and not until this is accomplished can you consider the job complete. Having shaken the bees into the box (presuming I have the greater portion), I flatten the zinc over the top and leave my assistant to care for them, whilst I search among the few that are left to satisfy myself that the queen is not there. I then return to the box with a knife, run it along the sides dropping a few at a time and search until I have secured and clipped her, when they are left for the scattered ones to cluster around her. The box should be stood on its side whilst this is taking place.

This lot was commenced at about 6 o'clock one Friday morning, and by 1 o'clock on Saturday everything was replaced with the boxes so full of bees that failure in transporting resulted.

With the above method, and this motto, "Search for the queen," I seldom meet with failure.

I do not trouble with the combs, as they are generally more bother than they are worth, but when I did I invariably gave them to an established colony to clean up, and not to the lot transferred, taking combs from the established colony for the new lot.

(To be continued.)

Division of Agriculture and Forestry.

REPORT FOR SEPTEMBER, 1909.

At the Central Experiment Farm work has been considerably handicapped through the lack of transport animals. Twenty mules were received on the 17th of the month, of which ten were unbroken. These are now being carefully handled in preparation of general field work with heavy implements. A wood and iron stable has been built for their accommodation.

The sheep, of which mention was made in the report for last month, have arrived, and shearing has commenced.

WINKEL SPRUIT EXPERIMENT FARM.

Staff and students at this station are all engaged cutting and trucking sugar cane, about 30 tons per day being delivered to the Illovo Mill.

That portion of the Farm abutting on the railway line is being planted with ornamental forest trees, two acres of *Pinus canariensis* being already planted.

Three hundred citrus trees have been planted.

WEENEN EXPERIMENT STATION.

The harvesting of cereal crops is now commencing at this station. Four varieties of early barley have been cut. From appearance the Smyrna variety promises well, but detailed results can only be published when all varieties have been threshed. The results of wheat trials at this station promise, from the general appearance of the standing crop,

to bear out those obtained previously, Standard Fife, Menenieu and Federation varieties all looking well.

Ground nuts and beans have been planted between lines of orchard trees. Eight new varieties of grape have been added to the vineyard and a plot of cantaloupe melons also planted.

CHIEF FOREST OFFICER'S REPORT.

For the month of August the Chief Forest Officer reports:—

During the tour of inspection in the Ingeli district of Alfred County at the latter end of the month, I realised very forcibly the immense dislocation of bush and farm transport caused by the regulations resulting from the East Coast Fever outbreak below Harding. All sawing and sale of every kind of forest produce is absolutely stopped, while the farmers—to whom we naturally look for road equipment—cannot get their own stuff to market, and some of them are in consequence pressed for ready cash. Rates for hired transport are prohibitive, and if there is any demand for railway sleepers from the Ingeli forests—which are full of suitable material—the tenders would have to be subject to delivery at the bush. At 'Ngomi a sawyer has received an order from the N.G.R. Department for a sample lot of 150 waterboom sleepers at 4s. delivered in Vryheid. Certainly there can be no comparison between the roads—the road from Zuurberg through Harding being in postcart order, while the Vryheid-'Ngomi road will cease to be even a track if not attended to—and it remains to be seen if railway sleepers can be delivered at Vryheid from 'Ngomi at a profit at 4s. The sample lot will be cut in a privately-owned portion of the 'Ngomi Forest, and I suggest that lemonwood samples be also called for. In all cases the N.G.R. should be particular that no sap-wood is paid for.

Foresters Purser, Chilvers and Fernando have been engaged on the completion of the markings of their cutting-sections. The last-named has been authorised to ring the cumberers or old-barks that cannot repay the cost of felling, but the canopy of which prevents regeneration. Ninety trees are so treated in A section, Xalingena. The Forester reports that as they are of great girth the ring-cuts could not be carried into the sapwood without unnecessary expense, but the cambium has been well cut through and he expected to find the trees dead in a few months.

Forester Chilvers suggests that we should demonstrate departmentally the value of equines in bush-work; and perhaps it would be good business, if the supply of sleepers required by the railway is large enough, to take on the contract, provide equipment, and employ sawyers by sub-contracts. Such a course would not only improve the Zuurberg Forest by the removal of lemonwoods and give employment at a profit to many men, but would be an object lesson to those who are now afraid to make the change from oxen to equines in bush-work.

Forester Gryspeerdt reports that a local chief had over 200 men cutting timber in the Manguzi Forest at Maputa for nearly three months, doing immense damage, just to build a barricade round his kraal. The Forester thinks that rubber, now 6s. 9d. the pound, will rise to 9s., and states that tons of it could be collected in his district. Climate is, however, a great factor in this problem, and transport another: a railway would make realisation of this wealth possible perhaps. Forester Leigh, of Entumeni, has issued permits to cut 80 bundles of wattles and asks for instructions. I can only tell him that, in the anomalous state of things in Zululand, Natives are allowed the free run of forest reserves as well as their own reserves, and that he can only refuse permits when the forest produce is required for sale.

Forester Purser has been offsetting the Ingelabantwana. Forester Fernando has beaconed the new boundaries of the Emkazení and repaired the whole length of the side. Forester Foster hopes to have the 'Ngomi nursery in complete order this month, but complains that he cannot get any of the numerous squatters owing arrears of rent to work. Neither will they pay their rent. I should like to take a very short way with them to prevent turning the forest into a criminal warren. A case now proceeding at Vryheid—the murder of a woman by a gang of these idlers—should throw some doubt over the system of rent-collection at present prevailing at 'Ngomi, and endorse the recommendation of the Magistrate, Ngotshe, to proceed at law in the ordinary course for the recovery of arrears, with costs of any lawyer employed.

Forester Purser is engaged on a case of poaching in the Gala Forest, near Bulwer, in which many Natives are concerned. Forester Foster mentions having come across in the 'Ngomi an animal he believes to be a honey-bear. It was about eighty yards away and looked like a brown bear, a little larger than a pointer dog.

E. R. SAWER,

Director, Division of Agriculture and Forestry.

Central Experiment Farm, Cedara,

20th October, 1909.

Unless you push yourself forward others will push you back. If you never try to do more than you have always done, you will never know how much you can do. Success will only smile on him who proves himself brave.

The Position of East Coast Fever.

LIST OF OUTBREAKS DURING SEPTEMBER-OCTOBER.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 21st September to 20th October:—

Dundee District.—Outbreak on the farms “Cotswood,” east of main line and north of Dundee—Vryheid, “Klip Rots,” east of main line, and “Bosch Hoek,” west of main line.

Umvoti County.—Outbreak on the farms “Summerford,” sub-division of “Groet Reit” and “Welgevonden,” “Mare’s Manor,” and “Summerville,” sub-division of “Reit Vlei” and “Craigieburn.”

Klip River District.—Outbreaks on the farms “Springvale,” sub-division of “Schaaplaats,” west of main line of railway, “Elandslaagte,” west of main line, and “Reuit Kuil,” east of main line.

Utrecht District.—Outbreak on the farm “Sportlespruit.”

Krantzkop District.—Outbreaks on the farms “Doornhoek,” “Scotsdale,” “Ingela View,” “Broeders Hoek,” “Mist,” “Wittekrans,” and “Ungkund,” sub-division of “Doorn Hoek.”

Lion’s River District.—Outbreaks on the farms “Good Hope,” sub-division of “Oatlands,” east of line, and “Ashley,” west of main line.

New Hanover District.—Outbreaks on the farms “Fountainhill,” sub-division of “Klein Noodsberg,” “Welverdiend,” “One House,” sub-division of “Forbesdale,” “Ashendon,” “Kruisfontein,” “Mollissima,” sub-division of “Dalton,” Inanda Location, and “Blambletye,” sub-division of York Settlement.

Camperdown District.—Outbreaks on the farms “Spitzkop,” and “Melbourne,” sub-division of “Valkop.”

Upper Umkomanzi District.—Outbreaks on the farms “Hopewell,” and “Alton,” sub-division of “Lilliefontein.”

Umgeni District.—Outbreaks on the farms “Wattle Grove,” “Kersdale,” “Claridge,” “Dennyvale,” “Faulklands,” and amongst Sir Henry Bale’s cattle at Hilton Road.

Alfred Division.—Outbreak on the farm “Enquabeni.”

No record is kept of outbreaks in the following Magisterial Divisions:—The whole of the Province of Zululand, the whole of Victoria County, Umsinga, Vryheid, Ngotshe, Babanango, and Paulpietersburg.

Farm and Garden Notes for November.

By GEO. CARTER, F.R.H.S.

THE MEALIE MONTH.

It is very little use talking about anything other than mealies this month, and even throughout the most of next month, in the midlands. All energies are directed towards getting as large an area as possible of this one staple crop in, and rightly so. One wonders for a moment what can be said about the crop, which, surely, every Natal farmer should know all about; but the loss is only momentary, for there is one outstanding item of failure, the reason for which cannot be pushed home too often. While I believe that a good many of our growers have reached very near perfection in this crop, the fact remains that the standard of the Colony as a whole is not yet a high one and that much improvement is possible *this year*.

I believe that one of the chief reasons for the eminent success of certain growers is the careful selection of seed, and inversely, that one of the chief causes of the low general grade is the want of selection. This is an oft-told tale, but the tale is generally told at the wrong time of the year, and forgotten when the planting time comes round. It needs to be pressed home *now*, at planting time. If we are to think of increasing our export trade the objective of *quantity* must have added to it the objective of *quality*—we must have clear, definite types—there must be no such thing marketed as a *mixed crop*, in either colour or variety. This mixing of colours and varieties is not confined to Natal only. I have handled a good many samples of grain from the Harrismith district this season, and in almost every case this was the one outstanding fault. As many of the Harrismith farmers are readers of this *Journal*, perhaps I may say in passing that unless the point of seed selection is attended to by them at once their produce will soon be unmarketable. And this remark applies to the oats grown in the same district also, the seed of which is now one of the most impure lots which I have seen in South Africa. Growers should remember that even a 3 per cent. impurity in the seed will have a very serious effect on the grain crop resulting, and every effort should be made to avoid planting such.

It may be that some of our readers have very little knowledge of the points to be considered in seed selection. Unfortunately this is not the time of the year when this work should be done, as the first part should take place in the ripe, standing crops. It is not enough that the grain offered should be large. It should be from a strong, healthy plant, a well-filled and shapely cob, and one quite pure and true to its variety.

The largest grain often occurs on a half-filled cob, and the "cob-faults" may be easily transmitted to the resulting crop. I will never forget one of our prize-winners telling me that he would not plant the seed with which he had taken first prize—he preferred to sell them, the reason being that a large proportion were from faulty cobs. This bears out a contention which I have made for some years, that the executive of all our agricultural shows should prohibit all exhibition of mealies which are *shelled* and have them all on the cob. There should be no such thing shown as a "sack" of shelled mealies, which anyone with time and labour can "fake" for the purpose. Each exhibit should be a definite number of "cobs," so that the primary points of a good mealie, length of cob, fulness of tip and butt, shape of grain, and proportion of grain to cob, may be decided in that form.

Now, how does this affect seed selection at this period? Each farmer, if he has been wise, will have his cobs selected for the above mentioned points, ready picked for shelling and planting now. And if there is a stack of unshelled mealies still to choose from the selection of cobs may be made on such lines yet—with, however, the one disability that the one who selects now knows not what manner of plant the cob was grown on. I believe that there will come a time when all seed mealies will be exchanged and sold on the cob, for in this form only can the purchaser be sure of the quality and purity of the seed.

To sum up these rather rambling remarks, I want to say: "Let every farmer look out his seed at once, and if it is not a good and pure type, and from good plants and cobs, *feed it to the horses and get something better.*" This may cost a few shillings in seed, but when one considers that the whole cost of seeding an acre of ground with mealies is only from one to two shillings, with the best of seed procurable, and that any little extra cost cannot be more than threepence per acre (while a choice of seed may, and probably will, mean an increase of many shilling on the crop value on each acre), then the point of economy in seed is not worth considering. The only other point to remember is to make sure the germination of the seed is right before sowing. I have nothing to say about varieties. Each farmer has his own fad on this point, or has proven by his own, or local, experience which kind will suit the soil best. One cannot recommend any one kind for the whole of Natal, and there are many first-class varieties to choose from now. Only let it be a standard sort, and not some miserable hybrid, without fixed characteristics, of which there are far too many marketed in Natal.

VEGETABLE GARDEN.

The chief crops to be attended to this month are Cauliflower and Celery. Both these are the better for a touch of cold weather before they are used, hence the seed should not be sown before November. As

soon as the nights get cold a crispness and flavour is added to them which comes in no other way.

CAULIFLOWER.

The only thing to be done this month is to sow the seed and make sure of getting perfect plants, remembering that a perfect seedling is half the battle with this crop. As November is not a good month for seedling raising in the open, you must get the standard seed bed principle to work, as mentioned in an earlier article. That is, after the levelling and firming the soil, sow the seed *on the surface* and cover with half an inch of sifted old manure only. Sow thinly, for practically every seed will get through by this method. Then, when the seedlings have four leaves each, thin out so that each plant has quite three inches each way in which to develop. This spacing will give ideal plants for moving into the permanent lines, with a trowel and a ball of soil, next month. All that is troublesome, but you will not regret the trouble when you see the perfect "heads" produced next May. The variety for this month's sowing is "Veitch's Autumn Giant," sometimes catalogued as "Italian Giant." The early varieties are left until January. We have several times scaled the "Autumn Giant" at 25 lbs. each, and not one of the new varieties of recent years has beaten it. Seed germinates in seven days.

CELERY.

Here again make a point of getting good, sturdy plants—but the method, for home use, is quite different. Celery is difficult to germinate in the open at any time during summer, the young seedlings being so easily burned off when scarcely above the ground. For home use only 50 to 200 good plants will be required, and these are best raised in a flat box of a handy size for carrying into the shade when necessary. The seed is fine, and should only be just covered slightly with sifted old manure. In about fourteen days the seedlings should be up, and in a month or five weeks they should be pricked off into other boxes spacing three inches apart each way. Some growers put them into the permanent trenches direct from the second box; others give them still another "shift" into the open garden first. Let there be no check for want of water at any time. More about the trenching next month.

KOHL RABI.

In the midlands and the coast belt there is great difficulty in getting turnips to "bulb" during the summer months. A very good substitute for these will be found in Kohl Rabi, which will "bulb" and grow perfectly all the year round. The quality is not equal to a turnip, perhaps, yet when turnips are unprocurable Kahl Rabi is an excellent substitute. When fully grown, the "bulb," or rather swollen stem (which is the edible part) attains to the size of a swede, but for house-

hold use it should be used when little bigger than a tennis ball. After that size there is a tendency to stringiness, particularly if watering has not been regularly attended to. The culture is exactly the same as for cabbage, except that the plants in the crop lines may be spaced a foot apart. The "purple" variety is the best.

FLOWERS.

The last sowing of Asters, Salpiglossis, Delphiniums, Snapdragons, Swan River Daisy and a few common annuals for autumn blooming should be made now, so that we may be free next month and January to consider those which will be classed as winter bloomers. This month also one must make plans for some items required to bloom next spring, these being either perennials or biennials, which do not bloom until the second season after sowing the seeds. A good many of our best perennials are best treated as annuals after all: for after once blooming well they will never again possess the same vigour and form, although they may grow on and throw flowers for several years. Columbines, of which the spurred singles are the most beautiful, Pentstemons and the closely allied Chelone, Foxgloves, Hollyhocks, Leucanthemums (Ox Eye Daisy) and Sweet Williams, all these, and some others, need sowing at some time between the end of October and the end of January, if we would have good plants to bloom next spring. In the colder districts at once; in the midlands a little later if you wish. The only reason for delay is that the plants will occupy the ground a month or two longer than is actually necessary. I mention these perennials and biennials because it is easy to forget them at the right season for sowing. It is not everyone who is in the habit of looking a year ahead in gardening, yet we must do this with this class. And I know the disappointment of remembering an important flower when far too late to sow it.

He who tears down without building better is a destructionist instead of a constructionist.

We learn from the *Standard of Empire* of the 24th September that a complete plant for the preparation of wattle bark in the disintegrated form in which it is used for the purpose of industry and commerce has been installed at the Government experimental station at Waerenga.

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

THE milk of a mixed herd, well fed, should yield 1 lb. of butter per 27 to 28 lbs. of milk on the average of the year; where the separator is used, and skilled hands employed, a high-class Jersey or Guernsey herd may yield 1 lb. of butter per 20 lbs. of milk, or even less.—*James Long and J. C. Morton ("The Dairy")*.

No one of us would ever dream of getting the best results in output from a half fed man or animals, and plant life is practically the same. It always pays in the long run to stop economy when it means starvation of either man, animal, or plant. But the food given must be proper food, and the proper plant food necessary will depend upon the crop required and the nature of the soil employed, and this can only be determined by individual experiment.—*J. D. Davidson*

IRRIGATION AND CULTIVATION.

The success of irrigation cannot be made complete without cultivation, and it is a fault too commonly observed among irrigators that they are inclined to depend too much upon irrigation and not nearly enough upon cultivation. The retention of the moisture when once supplied to the soil by means of irrigation may be largely controlled by keeping the topsoil when pulverised so as to break up the capillary tubes. The more recent scientists all agree that the soil is full of small tubes, through which the moisture from below finds its way to the surface and escapes. If these tubes can be closed the water will not evaporate so readily. This is done by loosening the topsoil, not by stirring it to such a depth as to injure the root of the plant, but in a manner so as to break the tops of the tubes and throw a covering of loose soil over the ground, and at the same time destroy the robber weeds which not only use the moisture but take away plant food as well. This loose soil is a mulch—a blanket which prevents loss of moisture and protects against the direct rays of the sun. There are, of course, certain kinds of cereal crops, such as wheat and oats, which by ordinary planting do not admit of cultivation, and these, from necessity, naturally require a larger quantity of water than do the cultivated or hoed crops.—*Luke Wilcox ("Irrigation Farming")*.

SPROUTING POTATOES.

Lavallee and many others have found that sprouting potatoes in a well-lighted room increases the yield and earliness, and produces a more vigorous growth of vines and a larger starch content in the tubers. One explanation offered for the increase in yield is that the short, thick, stem developed under the above conditions bears many scales or leaves for its height, and it is from the axils of these scales, the place where the scale joins the stem, that the tuber-bearing branches are produced. The more scales produced, the more opportunity for the development of tubers. If the tubers start growth in the dark, either indoors or below ground, the scales are formed at longer intervals, and there are correspondingly fewer places for the production of tuber-bearing branches. Also, in the latter case, the leaf-bearing branches produced above ground are weaker. The system is considered essential in the Island of Jersey and the early potato-growing districts of the United Kingdom, and is practical to a small extent for the second crop in the Southern States.—*Samuel Fraser ("The Potato")*.

SOIL AIR.

A proper circulation of air in the soil is just as important as any other factor of plant growth. Nearly half of the volume of ordinary soils is occupied by air spaces. The air spaces in the soil wind in and out between the soil particles, just as they do in a pile of larger stones. If the layer of water on the surface of the soil grains becomes so thick as to stop the air passages here and there the soil is then too wet for most crops and needs drainage. Plants have no special breathing organs, the oxygen required in their breathing finding entrance all over the surface of the plant. Plant roots must therefore be supplied with air, and hence the soil must be porous enough to permit of free circulation of air. A good supply of humus and proper tillage will accomplish this result in clay soils. Sandy soils are usually too porous, needing humus to help them retain water. Another reason why air must circulate freely in the soil is that large quantities of oxygen are required to insure proper decay of organic matter to supply plant food. Also, carbonic acid gas is produced by the decay of organic matter, and this must escape easily to make room for the atmospheric oxygen needed in the soil. The movement of air in the soil is frequently shown by the bubbles which appear at the surface of soil just after a hard rain. As the water soaks into the soil it drives the air out, and bubbles may be seen at the surface if water enough is present to form them. One of the most important objects of ploughing is to loosen the soil and mix fresh air with it.—*W. J. Spillman, Agriculturist, in Charge of Farm Management Investigations, Bureau of Plant Industry*.

IRRIGATING POTATOES.

The most common mistake in the irrigation of potatoes is to turn in a large head in each furrow, permit it to flow rapidly to the bottom of the rows, and then shut it off. This way of applying the water wets only the surface layer, and if it is not followed up immediately by cultivation a couple of days' sunshine will rob the soil of most of the water which has been applied and seal over the surface with a hard crust. In this condition the crops soon begin to suffer, and the unskilled farmer fancies that the only remedy lies in applying more water. A better plan is to turn a small amount of water into a deep furrow and permit it to run without stopping for hours or even for half a day. In this way the top layer is not saturated, the soil around the roots and beneath them receives a larger supply, and the surface may be cultivated shortly after each irrigation, so as to check evaporation and retain the moisture in the soil for the benefit of the crop.—*Prof. Milton Whitney, Chief U.S. Bureau of Soils.*

MILKING THE COW.

The first bacteria enter during the time of milking and are naturally from the cow and her surroundings. The manipulation of the udder works off hair, particles of skin, and in many instances particles of manure that adhere to the hair and udder. All of this material finds its way into the milk pail and carries with it great numbers of bacteria. The warm temperature and the presence of a congenial food supply that is in just the right physical condition cause these bacteria to multiply very rapidly, and unless something is done to check their growth souring or other evidence of decomposition will take place in a few hours. The rapidity with which these changes occur will depend almost entirely upon the temperature at which the milk is allowed to stand and the number of bacteria that find entrance to it. These facts are constantly in the mind of the careful dairyman. He knows that the first step is that of prevention. The work of milking should be performed in such a way that few bacteria will find their way into the milk. The milk should be cooled quickly and thoroughly immediately after it is drawn, in order to check the growth of those bacteria that will, under the best conditions, find their way into it.—*Edwin H. Webster, M.S., Chief of Dairy Division, Bureau of Animal Industry.*

Genius begins great works; labour alone finishes them.

Exchange Reviews.

WHAT OTHERS ARE THINKING AND DOING.

AN article in *Cultivatore* refers to the value of grape-vine prunings as forage. It is stated that such waste twigs possess 55 to 60 per cent. as much nutritive matter as meadow hay. It is recommended that they be ground up and fed in moderate quantities.

Manuring Cabbages.

The following mixture is recommended by C. H. Shipston in a recent issue of the *Mark Lane Express Agricultural Journal*, for the manuring of cabbages where farmyard manure is not available, and, as is stated, will give excellent results:—6 cwt. per acre of pure dissolved bones; 1 cwt. sulphate of ammonia; 1 cwt. muriate of potash (or 4 cwt. of kainit). Top dressing when the cabbages are half grown with 1 cwt. per acre of nitrate of soda or nitrate of lime.

In-Breeding.

In a paper on In-breeding, Mendelism, and the Elucidation of Live Stock History, read at the Dublin meeting of the British Association for the Advancement of Science, Mr. J. Wilson emphasises the advantage of in-breeding, and cites the deer as an example in nature. "The strongest male retains command of a flock until he is ousted by some other animal, who is in all probability a younger brother or a son of the previous master male." The various theories of the origin of the Dexter breed of cattle are reviewed and discarded. "Mendelism shows clearly that the Dexter is a hybrid breed, the original races being a slender black race and a stout red one like the Devon breed of cattle. . . . Mendelism is evidently going to be of great service to the historian of live stock."

Influence of Soil in Horse-Breeding.

A recent issue of the *Live Stock Journal* contains a useful article under the above heading. As the writer points out, there is no point which is of more vital importance to success in the breeding of horses than that the land on which they are bred and reared should be of a suitable character for the purpose. This, in fact, constitutes the chief fundamental requirement in horse-breeding, as all experienced breeders will agree. For instance, really heavy and massive Shire horses can be

raised only on rich and fertile land of a heavy character where the grazing is of the best, as well as very abundant. In the case of the light breeds of horses, also, richness of soil tends towards massiveness of shape, just the same as it does in the case of cart horses. But the requirements of this class of horse as regards suitability of soil are, of course, of a different nature to what they are in the case of the heavy Shire. They represent an altogether different type of horse, in which the development of mere weight of body is not the principal desideratum. The biggest and most powerful light horses can be bred on soil which would not be suitable or good enough in point of richness for producing really weighty and first-rate Shire horse-stock.

In no other direction does the nature of the soil exert a greater degree of influence upon the horse-stock bred on it than it does in regard to the size and quality of the bone, and also the quality of the structure intimately connected with the bone—namely, tendons, sinews and ligaments. The principal ingredients which go to build up the bones are lime and phosphates: hence, where the soil is deficient in these important constituents, the feed it produces does not contain a sufficient amount of bone-forming material to assure a full development of the bones in young horses, and under these unfavourable conditions they naturally remain light-boned and weedy. It is impossible to breed big-boned horse-stock on such unsuitable land. Of the various kinds of soils, no other is so favourable to the development of big bone—and that of the very best quality—as a good limestone soil. This is admittedly the most suitable for the breeding of good horses, and especially of light horse-stock of a tough and hard-wearing sort. The stoutest and best horses are bred on land of the limestone formation.

Effect of Soluble Salts on Growth of Sugar Cane.

In a recent issue of the *West Indian Bulletin*, the author, J. B. Harrison, discusses, on the basis of experiments extending over a number of years, the effects of long-continued applications of sulphate of ammonia and nitrate of soda on the productiveness of the soil, the effects of cultivation and of manures on the composition of the soil waters of the sugar cane fields, the relation between temporary and permanent alkalinity of soil waters, the proportion of nitrogen in tropical soil waters, and the concentration of the subsoil water.

The general reaction of the fertile heavy clay soils of British Guiana is slightly alkaline, and a decided and comparatively rapid increase of the alkaline salts in the soils under experiment was observed. This concen-

tration of salts exerts a decidedly injurious effect on the physical properties of the soil and on the growth of cane, but promotes the activity of nitrifying organisms. "The alkalinity of the soil may explain why sulphate of ammonia gives better results than nitrate of soda when applied in large amounts." The remedies suggested by the author's experiments are deep drainage and the application of gypsum, calcium phosphates, and other neutralising materials.

Composition of the Air of Cultivated Soils.

A series of investigations on the conditions which influence the composition of the soil air is reported by E. Low, in a recent issue of *Beiträge zur Kenntnis der Zusammensetzung der im Ackerboden befindlichen Luft* Diss. Rostock, from which the following conclusions are drawn. The soil air is richest in carbon dioxide in summer and poorest in winter, the amount apparently varying with the temperature and the consequent intensity of the decomposition of the organic matter and the formation of carbon dioxide. The air of sandy soils contains the least carbon dioxide, that of moor soils the most, the air of loam soils being intermediate in this respect. The carbon dioxide content varies with the humus content as well as with the physical properties of the different soils. It is smallest at the surface and increases with the depth, the differences in this respect being greatest in case of moor soils and least in sandy soils. The oxygen content stands in definite relation to the content of carbon dioxide, that is, the richer the soil air in carbon dioxide the poorer it is in oxygen, this being clearly due to the fact that the carbon dioxide results from the oxidation of humus.

Plant root respiration has a marked effect upon the carbon dioxide content of the soil air. The air of soils bearing plants is decidedly richer in carbon dioxide than that of bare soils, and the carbon dioxide content is greater in the vicinity of the plant roots than below them. The carbon dioxide content increases with the growth of the plants and with the rise of temperature. Soils bearing potatoes and lupines contain larger amounts of carbon dioxide than the same soils bearing other crops. This is attributed to the fact that potatoes and legumes have a higher rate of respiration than other plants. The application of barnyard manure is equally as effective as the root action in increasing the carbon dioxide content of soil air.

Cattle Feeding Experiment.

An experiment to compare the feeding values of decorticated cotton cake with the same weight of linseed cake and undecorticated cotton cake, given in equal proportions, was carried out by the Agricultural Depart-

ment of the University College of North Wales, the results of which were published in the *Live Stock Journal*, in its issue of July 30th. Two lots of bullocks, four in each lot, were selected and weighed on December 9th, and from that time till the experiment came to an end, on February 18th, both lots received an average daily ration per head of pulped roots, chaffed hay and straw, and a little long hay every evening, made up of 70 lbs. of swedes, $7\frac{1}{2}$ lbs. of hay, and $7\frac{1}{2}$ lbs. of straw. The decorticated cotton cake gave superior feeding results to those obtained from the use of the mixed cakes. The fact that the manurial value of decorticated cotton cake is considerably higher than that of the other two cakes furnishes an addition reason for its use.

Transferring Boric Acid from Cattle Food to Cow's Milk.

Investigations were conducted to show the possibility of transferring boric acid from cattle food to cow's milk, at Armstrong College, Newcastle, the results of which are contained in July 26th issue of *Mark Lane Express Agricultural Journal*. The main question: "Can boric acid get into milk as a result of feeding cows on food containing boric acid?" is answered in the affirmative.

However, the amount of boric acid that can get into the milk from food is small and could not possibly enable the milk to keep sweet for a longer time. As milk needs $\frac{1}{4}$ per cent. boric acid to produce any useful preservative influence, there seems no difficulty in distinguishing between milk preserved with boric acid and milk contaminated by the use of foods containing boric acid. If milk be found to contain more than 0.1 per cent. boric acid the milk has probably been deliberately preserved with some boric preservative, but if less than 0.01 per cent. boric acid be found in the milk, the source of that small amount of boric acid is to be looked for in the food of the cow; whilst if between .1 per cent. and .01 per cent. boric acid be found, the origin of the boric acid is uncertain.

Don't allow the boy who drives your cows to and from pasture to throw stones at them, nor to run them to see which one is the fastest on foot.

Reviews of Books.

FRUIT-PRESERVING.

"SUCCESSFUL JAM MAKING AND FRUIT BOTTLING." By Lucy H. Yates. Illustrated. London: Rebman, Ltd., 129, Shaftesbury Avenue, W.C., 1909. 2s. 6d. net.

Jam making, and fruit-preserving generally, is a subject in which, directly or indirectly, every farmer is interested. Whether he is concerned in turning to account the fruit which distance from the railway makes it unprofitable to market in its fresh state, by preserving it for home use or for the market, or whether he makes a point of setting aside a portion of his fruit crop every year for home use on health grounds, or whether he finds that, all things considered, it is preferable to preserve the bulk of his fruit and market it thus rather than in the raw state, he is always in some degree at least interested in fruit preserving, and even more so, in a direct way, is the farmer's wife.

Under present conditions in Natal, fruit preserving is a subject which is perhaps of more interest than it is in other countries. Whilst nearly every farmer grows fruit, it is only the most favourably situated as regards proximity to the railway and to the market who can hope to realise sufficient profit to repay them for the attention they have given to their orchards and the time they have devoted to and the time they have taken with the picking, sorting, packing, and marketing of their fruit. For the majority, the only way of turning their fruit crop to account, short of giving it to the pigs, is to preserve as much as possible of it in various ways. Some farmers find it a fairly lucrative proposition to market their fruit in this form, and, apart from this, there are always the requirements of the family to be considered and provided for in advance for the year.

There are people who can make excellent jam with first-rate keeping qualities; there are people who can make good jam, which, however, will not "keep" for more than a very limited period; there are others still who make "jam" which is neither wholesome nor palatable nor which will "keep." The book before us is one which will be found of value by all these classes, for the best jam-maker can always learn something. This is not an ordinary book of recipes: it is a useful little treatise on jam-making and fruit-bottling, from start to finish, containing directions for the making of fruit preserve in the home on either a large or a small scale. After a useful introductory chapter by Mr. G. Cadogan Rothery and a few general remarks by the authoress herself, the book describes the boiling shed and its fittings, the storeroom, and stoves and boiling

paus. Peeling, coring, and stoning machines are next dealt with, and the vacuum process of sealing is described, together with sterilising appliances useful in connection therewith. Recipes for a good cement for sealing bottles and an ink for bottle labels bring this section of the book to a close. Chapter III. deals with the selection of fruits, with particular reference to gooseberries (English), currants, raspberries, strawberries, cherries, apricots, peaches, plums, greengages, apples and pears; whilst the treatment of fruit—when and how to gather, clean, and grade, how to treat different kinds of fruits—forms the subject of the next chapter. In this chapter also whole fruit conserves are discussed, as also fine, medium and ordinary jams, jellies, etc. Chapter V. is wholly taken up with a discussion on sugar—cane and beet sugars, the appearance of pure sugar, tests, etc. In the next two chapters we have recipes for different fruits, including specialities, such as marmalades, jellies and fruit pastes. Storing and packing, and marketing form the subjects of the final chapters of the book.

We can recommend this book to midland and up-country Natal farmers, as well as, to some extent to coast farmers, although the only Natal coast fruits dealt with are citrus fruits. The book will be found to contain many useful hints, and to those who are engaged in jam-making on anything like an appreciable scale the book will be invaluable.

DAIRY WORK.

“SUCCESSFUL DAIRY WORK.” By A. T. Matthews, Market Reporter to the Board of Agriculture. Illustrated. London: Rebman, Ltd., 129, Shaftesbury Avenue, W.C. 1909. 2s. 6d. net.

“Of all foods, milk is the most important, because it is almost indispensable to the growing child, the invalid and the aged, and invaluable to the robust worker. It is a perfect food for all but the active worker, possessing the various constituents for sustaining life and for the growth of the young. But of all foods it is the most susceptible to many influences, some of which may render it unfit for human consumption and even a positive danger to health. Milk, in fact, is very easily contaminated, and, to be at its best, it must be derived from a healthy cow, that has been properly fed and kept under hygienic conditions. Strict cleanliness, from the milker’s pail to the consumer’s jug, is absolutely necessary, otherwise the milk will turn sour and become a breeding medium for innumerable bacteria. Thus concisely and yet comprehensively does Mr. G. Cadogan Rothery, in the course of an interesting introductory chapter, sum up the problem of milk supply—the problem that every modern dairyman places before himself, and the problem that Mr. A. T. Matthews, in his book, “Successful Dairy Work,”

sets out to solve. From the drawing of the milk from the cow down to the regulation of the milk trade by law, he tackles the whole subject in a thoroughly practical manner, dealing in turn with the planning and construction of dairies, the manipulation of milk, the manufacture of milk products, adulteration and preservatives, costs and profits, organisation of the milk trade, milk legislation, etc.

The book is characterised by a conciseness and clearness of expression that will appeal to the busy man who wants to get at the facts and has not the time to devote to the perusal of ponderous volumes in which what he wants to know occupies a relatively small place. At the same time, Mr. Matthews has not "scamped" his work, dealing as fully as is requisite for the needs of the class of reader for which the book is intended—that is to say, the practical man.

We can recommend the book as a useful one to those of our farmers who are interested in the subject of dairying and milk supply.

ESTATE MANAGEMENT.

SMALL ESTATE MANAGEMENT. 'The Estate Agents' Guide to Building and Management of Estates, Small Holdings, Cottages, etc. By Albert C. Freeman, M.S.A. Illustrated. London: Rebman, Ltd., 129, Shaftesbury Avenue, W.C. 1909. 2s. 6d. net.

This is a book which is primarily intended for estate agents, but there are others who will find much in it of value. The work comprises discussions on the management of estates and the duties of an estate surveyor, the Small Holdings Act of 1907, and the provision of homesteads, the planning and construction of farm and other buildings, the construction and arrangement of dairies, and the working of small holdings. Chapters III. and IV., dealing respectively with the construction of farm buildings generally and dairies, will be found of value by farmers, as full plans and suggested measurements are given which should prove very useful. The bulk of the book is, of course, of more interest to the English than to the South African reader, but there is much in it that will be found interesting and useful by people living in this country.

Some people think sour milk is not good for poultry. Milk in any form, sweet, sour, or butter milk, is good and largely takes the place of meat.

Among the Farmers.

THE ASSOCIATIONS DURING THE MONTH.

* * * *The attention of secretaries of agricultural societies and similar bodies is drawn to this section of the Journal, which has for its object the publication of reports of farmers' meetings, annual reports, presidential addresses, etc.; and it is hoped that full use will be made of the facilities here offered for the dissemination of news regarding such doings of the many associations all over the Colony as are likely to prove of general interest to readers of the Journal. In forwarding copies of presidents' reports, etc., correspondents are respectfully requested to make sure that they give the date of the meeting on the occasion of which the address was delivered or report read.*

WEENEN.

THE Weenen Agricultural Society held their annual general meeting on the 21st August. The President of the Society, Mr. Allan Stuart, occupied the chair, and among those present were the Hon H D Winter, M.L.A., Mr J W Moor, M.L.A., Mr A F Henderson, C.M.G., Colonel D W Mackay, Messrs E B Griffin, J.P., H Blaker, J.P., J Ralfe, J.P., W Ralfe, J.P., J Rencken, J.P., C Hair, R H Ralfe, F F Churchill, M.L.A., J H K Miller, H H Borlase, J Williams, S Bennett, E Hodgson, Dr J B Brewitt, Dr Gordon Cummings, C Ralfe, W Ballantyne, R Ralfe, G M Steere, S Vaughan, F C Robinson, H Vaughan Norton, A B Koe, F C Schiever (hon treasurer), and E Cauthery (hon secretary).

TREASURER'S REPORT.

The minutes of the last meeting having been read and confirmed, the Treasurer submitted his report, as follows:—

“Mr. President and Gentlemen,—I have pleasure in presenting you my report for the year. The statement of revenue and expenditure before you shows a balance of £82 15s. 3d. to your favour with the Standard Bank. Taking into consideration the general depression in the country, and the fact that we had neither the grant from the Government, nor any revenue out of stock sales—two very important items of revenue in ordinary years—the result is a fair one. I should not have been in the fortunate position to show this balance had it not been for Mr. Robt. Ralfe, sen., who again undertook the arduous task of collecting funds for your Society in Durban and Maritzburg. He brought the handsome amount of £146 19s. 6d., and in addition a great number of value prizes. Local donations and subscriptions were, I am sorry to

say, far behind last year, they being as follow:—Donations: 1908, £122 7s. 6d.; 1909, £65 6s. 6d. Subscriptions: 1908, £223 10s.; 1909, £161 9s. 6d. Totals: 1908, £345 17s. 6d.; 1909, £226 16s.—a shortfall of £119 1s. 6d. The reason for this is not far to seek. You have on the general committee alone 22 men behindhand with their contributions, to say nothing about the other regular subscribers who have not paid up. [The lack of interest displayed by members lately in the affairs of the Society is most deplorable. At meeting after meeting your secretary has had the greatest difficulty in getting a quorum, to enable him to get on with the business of the Society. This state of affairs is not very encouraging to your officers.

“Hall Revenue.—This shows a substantial increase, amounting to £160 6s. 11d. for the year, against £105 15s. 3d. last year, and was the largest amount collected for rent in any twelve months since the hall was opened. I believe you might in the near future look forward to the place being self-supporting, if it were not for the exorbitant rates your Society has to pay on a building from which the public of Estcourt derives all the benefit.

“Shows.—The annual show was all that could be expected in these times, and was, with all functions in connection with it—*i.e.*, smoking concert and county ball—financially and socially a success. Unfortunately, I cannot say the same in regard to the horticultural shows. These shows do not get the support from the public that they deserve, and certainly the unfavourable weather on both occasions this last year is answerable for a good deal; but it appears to me that this is not the only reason responsible for the failures. As your Treasurer, and much against my wish—as I am greatly interested in horticulture myself—I must advise you to abandon these shows for the future, unless this next season brings a vast increase in exhibits, and a very much larger attendance on show days. The items on the opposite side of the statement before you are the usual ones, and hardly require going into.

“Having done with the figures on the balance-sheet before you, it is my duty to remind you that nothing has been done in regard to the bond over your property. No effort whatsoever has been made to pay off, or even reduce, this bond. A committee of three was appointed at the annual meeting last year to inquire into the matter, but nothing came of it. After that the Secretary called a meeting, in July, of the Executive and Finance Committees, to consider the question, with the result that the usual three turned up, besides your officers. Before I conclude my report I wish to impress upon you, gentlemen, that it is absolutely essential that something should be done in regard to this matter. The bond of £2,500 falls due again in November, 1910, and the members of the Society are in honour bound to relieve as much as possible those men who were generous enough to become guarantors for

this amount. I appeal to every member of the Society, and to every man in Weenen County who has the welfare of the Weenen Agricultural Society at heart, to see that this liability is done away with. Then, and only then, will your Society go ahead."

PRESIDENT'S REPORT.

The report of the delegates to the Conference of the Natal Agricultural Union (Messrs. J. H. K. Miller and H. Blaker) was submitted; and the President (Mr. Allan Stuart) then read his annual report, as follows:—

"Gentlemen,—I have much pleasure in presenting to you the forty-fourth annual report of the Weenen Agricultural Society.

The Show.

"In doing so, I regret having to report that an unfortunate outbreak of East Coast Fever in the north-western portion of this county, in March last, rather seriously affected the prospects of our show, as some of the members thought that the show ought to be abandoned. A meeting was, therefore, called in May to decide the point, and a resolution was carried that we should hold our show as usual. The show was therefore held on June 24th, and, although not coming up to the standard of previous years, it could not be called a failure.

"*Horses*.—These came forward in about the same number as last year, and the quality was quite up to last year's standard.

"*Sheep*.—There was a slight falling off in the number of sheep, but quality was well maintained.

"*Goats*.—Only three entries came forward, and they were all the property of one exhibitor; they were, however, very nice animals.

"*Pigs*.—There was a good show of pigs, and both in number and quality were equal to any other show in the Colony.

"*Poultry*.—There was a fair show, and a number of good and useful birds were exhibited.

"*Cereals* were quite up to the last year's show both in quality and number of entries, more especially in the mealie class was this part of our show good. The two special prizes presented by Mr. T. L. Fyvie for mealies on cob, and Kafir corn on head, having a large number of entries, must have given a good deal of trouble in forming a decision. Mealies in the country this season, if not a record crop, must be quite equal to any previous year, but even this crop must not be taken as all this county can do in the way of producing mealies, as we were unfortunate in having a spell of drought in the month of December, which was responsible for a shortfall of at least 30 per cent. of our output.

"*Roots*.—In this section we had a fairly good show.

"*Manufactures*.—In this section our show was a failure. I am unable to understand why this was so. We had no good special prize

offered, but even the Socety's prizes were not filled up. After the fine display of jams and preserves made by the ladies of this county in 1908, it was most disheartening to me to see our hall almost empty in 1909. I trust that the ladies, for the good name of our county, will not allow this to occur again.

"Implements.—In this section we had the best display of farming implements that has ever been exhibited at our show before, and I must here thank Messrs. Malcomess & Company and Messrs. G. North & Sons for the trouble and expense they went to in filling up our yard with good and useful implements. Mr. Cosmo Moor offered a handsome prize for Natives to put a Hornsby single furrow plough together. The Natives came forward in numbers to compete for the prize, and one Native completed his work in thirty-six minutes. This, I think, would have been good work even for a tradesman. I must thank Mr. Moor for the kind thought in offering the prize.

"Extra Exhibits.—I must thank all those who put on extra exhibits at considerable trouble and expense. Messrs. A. F. Brokensha & Co., goods made from South African wool. Messrs. W. H. Griffin & Co., Quibell's dips. Mr. H. Rohde, English made implements. Johannesdals Timber Co., Ltd., iron gates and models of buildings. Mr. I. T. R. Reade, goods manufactured from mealies and mabele. Considerable interest was taken in an extra exhibit of mealies grown at Bray Hill, having been fertilised by Weenen phosphates. Farmers who saw these mealies must, I think, admit that the discoveries near Weenen of large quantities of phosphate rock are most valuable to the county of Weenen, and, I may add, for the whole Colony. It is also gratifying to know that it is a syndicate of Weenen County gentlemen who have taken up this industry, and are willing to give their money and their time to prove its value. I wish them all the success they deserve. There was another Weenen County industry also worthy of exhibit, but it was too late for insertion in our catalogue. A trolley, a four-wheeled spider, and a two-wheeled buggy, made by Mr. Walter Ballantyne at Mooi River. They appeared to be good value for the money asked for them.

Horticultural Show.

"We held our rose show on October 30th, but through bad weather and want of support it was not a success. I think the incoming committee will be well advised to abandon this show. Our midsummer flower show was held on February 11th. Bad weather was also greatly against this show, and, although not quite a failure, could not be called a success. I think the show could be made much more popular if the incoming committee could get three or four ladies on to their committee, and also add to their prize list some industrial work for girls of a certain age, such as plain needlework, fancy work, crochet, canvas, or ribbon work, also some domestic work such as pastry, cakes, sweets, etc.

Death of Mr. J H Wallace.

"It is with extreme sorrow that I have to record the death of one of our fellow members in the decease of Mr. John H. Wallace. Mr. Wallace, a colonist of many years' residence in this Colony, came out as one of the contractor engineers to build our railway from Durban to Ladysmith, and became well known in the Colony when doing this work. Upon completion of the contract he bought the farm "Cliffdale," in this county, and settled down as a progressive farmer. He was once returned to the Legislative Assembly for Weenen County, and held the office of Minister of Lands and Works under the Government of the late Hon. Harry Escombe. Nature had been kind in endowing Mr. Wallace with the gift of eloquence and a ready wit. Having had the advantage of a professional education, he stood head and shoulders above the ordinary farmer of this Colony. Mrs. Wallace, I am quite sure, has the sympathy of this Society in her irreparable loss.

Advisory Boards and E.C. Fever.

"Advisory Boards are still in office in most districts of the Colony. Some districts, however, have refused to re-elect any Boards, holding that, as the Minister has withdrawn most of their authority, they are of very little value in their districts. While willing to admit that some Boards have been careless and made mistakes, there was no justification for the strong language used by the Minister of Agriculture at the Agricultural Union Conference against Advisory Boards. As a whole, the men who are now controlling the movement of slaughter cattle are no more infallible than were the Advisory Boards. Unfortunately for this county, an outbreak of East Coast Fever occurred in March last in the north-west portion of the county. At first it was feared that a large portion of the county would be infected, but this does not appear to be borne out. By recent events I would suggest that a public meeting of all cattle owners in the county be held at an early date, and not only to ask, but demand, that this outbreak be stamped out, and express their willingness to pay a tax on all cattle in the county to defray expenses for guarding this district.

Miscellaneous.

"Our delegates to the Agricultural Union Conference were Messrs. H. Blaker and J. H. K. Miller. Their report has not yet been laid before you.

"Our Hon. Treasurer's report will have shown you that financially the Society is in a sound condition. For this I have to thank all those gentlemen who have given donations towards our funds. Amongst them are Messrs. Randles Bros., of Glen Lynden, two gentlemen who appear to take a keen interest in the affairs of this county.

"The Society is also largely indebted to Mr. Robert Ralfe, sen., who again went to Durban and Maritzburg and collected a large sum of money and a number of prizes in value for the Society. I thank all those merchants, professional men, and tradesmen who so liberally subscribed, and I must also thank all the residents of Estcourt who subscribed to our funds.

"On the evening of our show we held a most successful smoking concert, when a large number of valuable special prizes were offered for the 1910 show. If East Coast Fever can be cleared out of the county, a good show is assured.

"Our hall and grounds are in fairly good order and condition, wear and tear excepted.

Industries.

"Indigenous industries of South Africa, those closely connected with the soil, have made great advance of late years, especially in maize and other cereals also. The farming of ostriches, sheep, cattle, and varied articles of commerce obtained from these animals in Weenen County, and I may say the same all over the Colony. Agricultural conditions are undergoing constant improvement, the class of animals becoming better year by year, while the flocks are rapidly increasing in number. It is also worthy to note that more care is taken in the production, collection, and marketing of all produce—especially wool, feathers, mealies, fruit, and tobacco, and higher prices are being obtained as a reward for extra pains.

"There is evidence that all Natal articles for export are being more and more appreciated in the world's markets, and that increased care and attention is bringing its own reward. Mealies especially have found favour, and buyers from overseas are turning seriously to Natal for their future supplies, and express nothing but praise for the class of articles which have lately been shipped. As a Society I feel that we ought to express our appreciation for the assistance which was given by the Government in the matter of railway rates, and to the shipping companies in reducing the sea freights, which have so materially facilitated the export of mealies overseas. The result of this has been so satisfactory to the producer in opening up new markets that the prices of mealies in this country has been raised, and has further demonstrated that a larger market could be found for the products of this country.

"I hope that the experiments, having given such satisfactory results, will encourage the Government and shipping companies to arrange freight for other products on such terms as will increase the productions of all exportable produce and materials.

THE SOCIETY'S HALL.

"Urgency must be my excuse for again referring to the bond on our hall, and to impress upon the members of the Society the necessity

of something being done to reduce the amount, or to pay off this bond altogether.

"At our last annual meeting a small committee was appointed to make inquiries and suggest some schemes by which this bond could be taken over by the members of the Society themselves, but no report has been received from that committee.

"During the last year the revenue of our hall has largely increased, and the hall will, I am sure, in the near future, be a source of income to the Society, instead of the burden it has been in the past.

"We are on the eve of Union with the other Colonies, and, in my opinion, under the Union the possibilities of Natal are enormous. We ought therefore to see that our hall and showyard are kept up to date, and be ready for prosperity when it comes.

"Our Curator still continues to take keen interest in our hall and grounds, and I think it must be noticeable to members that our hall is in a more cleanly state to-day than it was sometime in the past.

Judges and Stewards.

"I sincerely thank all those gentlemen who so kindly came forward and helped the Society as judges and stewards. Our yard steward, Mr. A. L. Clouson, at show time was unable to attend, and the duties were undertaken by Mr. H. G. Wheeler, who carried out the work quite to my satisfaction, and I feel sure to the satisfaction of every member of the Society.

"It now remains to me to thank all the elected officers of the Society, who one and all have worked hard to make the year a success, and have made my year of office a pleasure to me."

Officers for the forthcoming year were then elected.

In connection with next year's show, it was decided, provided the assistance of the ladies be secured, that a bazaar be held to raise funds towards reducing the debt on the hall, and the following committee was appointed to deal with the matter:—President, Treasurer, Hon. Secretary, Messrs A F Henderson, C.M.G., J W Moor, M.L.A., R H Ralfe, Hon H D Winter, M.L.A., Dr Brewitt, and Dr Gordon Cumming.

A vote of thanks to the chair terminated the meeting.

MALTON

The annual meeting of the Malton Farmers' Association was held at Malton on 31st August, when the President (Mr. C. L. Lund) delivered the following address:—

PRESIDENTIAL ADDRESS.

"It is with very great pleasure that I have the honour of again reviewing the work done by the Malton Farmers' Association and by the farmers of this district during the past year. To review the work done

by the Association will not take up many minutes, for it is greatly to be regretted that, apart from appointing delegates to attend the annual meeting of the Agricultural Union, this Association has done very little, and it seems a pity that more is not done, but in this respect this Association appears to be very much on a par with similar Associations throughout the Colony. But, although this Association has been in a more or less moribund condition, it is very gratifying to be able to report that the work of the members on their farms has been carried on with so much energy and ability that the crops produced this season have eclipsed all previous records, good as some of these records have been, and as fairly remunerative prices have ruled for this district's staple product (mealies), and also for wattle bark, we may safely conclude that the Colony's exchequer will receive substantial contributions through the medium of the Income Tax.

"During the coming year, although these contributions will be considerably reduced through the large expenses that have been incurred by every member of this Association in having to purchase mules and donkeys to substitute our former excellent draught animals, the trek oxen, I am afraid that when the ploughing season comes round, and we are anxious to hustle, and get on as quickly as possible with planting operations, we will find these mules and donkeys but poor substitutes for the reliable trek ox who has done so much in the past for the development of this district, and not only for this district, but for the whole of South Africa. However, let us hope, and I think that we safely may, that we will have to endure these substitutes for only a few years, when we may again get back to using the best of all draught animals in South Africa—the trek ox.

"The export of mealies appears to have been somewhat checked, not by the inability of the farmer to produce, for it would appear that the farmers throughout South Africa have made such effective efforts at producing, assisted by a plentiful and seasonable rainfall, that they have produced so much that the arrangements made for exporting have been totally inadequate. It is, however, very much to be regretted that many farmers have been so grasping, and altogether blind to their own interests, that they have sent forward mealies that were too wet for export, thereby hampering and interfering with the facility of the export arrangements.

"It is, however, not the Natal farmers that are the principal offenders in this respect, but the mealie-growers of the Orange River Colony and the Transvaal, and as mealies in those Colonies are so much later in coming to maturity, and remain free from weevils for a much longer time than do the mealies in all the best mealie-growing districts of Natal, I think it would be a wise thing if the N.G.R. were to refuse to carry mealies from those Colonies before, say, about the beginning of

August, thereby ensuring the mealies being perfectly dry. In this connection, it cannot be too seriously impressed upon all farmers to see that all mealies sent by them for export are perfectly dry and in sound condition, and to make the maintaining of Natal's good name for maize in the European markets their first consideration, for depend upon it, if we lose this export trade, we will very soon again have mealies being sold in Natal at prices that will be far from profitable.

"There is one thing that everyone who has Natal's best interests at heart cannot view without some misgivings, and that is the fact that numbers of Natal's best Colonists are leaving this Colony and going North, and to other parts of Africa. This fact is the more disconcerting when one considers the enormous amount of land that we have in Natal that is either not cultivated at all or only cultivated in a crude and primitive fashion, consequently only yielding a small percentage of what it ought to yield. It seems, therefore, a great pity that we should be losing the very men who are best fitted to develop this undeveloped mine of wealth. One scarcely knows who or what to blame for this state of affairs. It cannot be because the Government has no sympathy with the agricultural interests of the country, for surely if ever a country had a Government in sympathy with its farming interests, that country is Natal, and in proof of this one has only to consider the enormous amount of money that has been spent by the State on irrigation schemes, which schemes, however, are unfortunately absolutely unproductive, and the still larger amounts that have been spent on Experimental Farms throughout the Colony, which give a return which is not at all in keeping with the money expended on their establishment and maintenance. All these go to prove at any rate that the Government try to do what it considers best for its agriculturists, and yet these agriculturists are the very men that are leaving us. I think the chief reason why this undesirable exodus is taking place is because individuals and companies own large tracts of land which yield good dividends to the owners in the shape of Kafir rents.

"The recently enacted law imposing a tax on all lands not beneficially occupied by Europeans ought to do a great deal towards remedying this state of affairs. Another thing that is driving people out of the country is the demon tick, and it is somewhat humiliating to think that such an insignificant thing should have such an effect, and it behoves us to do all we can to eradicate this pest from our Colony. Although we very much regret Natal's loss sustained through the migration of many of our best farmers, we cannot but think that such migration will be for the ultimate advantage of United South Africa, in so far as these men with practical up-to-date and progressive ideas are bound to have an educational effect in the districts to which they are going, which will be far and away greater than the establishing of any number of experimental farms.

“East Coast Fever.”—Since our last annual meeting this terrible disease has continued to spread to such an alarming extent that to-day there is scarcely a farm in our district where it has not made its unwelcome appearance. The spread of this disease has taken place in spite of all our efforts to check it. Fencing, dipping, spraying, isolating, and all other means adopted in the hope of checking the disease have all alike failed. This forces one to the unpleasant and unwilling conclusion that in a tick-infected district like our own it is almost futile attempting to save our cattle. At the same time I do not agree with those who advocate the removal of all restrictions, for I think this would be a most suicidal policy, for, although the restrictions imposed have not had the desired effect in many parts of the Colony, it cannot be denied that there are many parts of the Colony that are to-day free from the disease that would certainly not be enjoying this immunity were it not for the rigid enforcement of the East Coast Fever restrictions; and, furthermore, there is no doubt that so far no other means have been discovered whereby the disease can be fought against with such good results. It would appear that we are as far off as ever from obtaining a cure for this fell disease. Notwithstanding the professors and laymen who from time to time have come forward with reputed cures. It is a great mercy that this disease moves only slowly upon its first entering a herd, as the owner of cattle has thus an opportunity of disposing of all uninfected animals for slaughter, and for the life of me I cannot understand why farmers should so adversely criticise the Government for making arrangements whereby they (the farmers have an opportunity of minimising their loss to a very great extent.

“The wattle industry continues to prosper, and those responsible for its introduction and establishment are deserving of all credit, for I think I am right in saying that this is one industry that has had no sort of assistance whatever from Government, but has, on the other hand, been of considerable assistance to the Colony’s finances in providing considerable traffic for the railways, and further in paying full and profitable rates on all bark carried.

“During the past year several disastrous fires have occurred in different wattle plantations, bringing loss and disappointment to the owners and emphasizing the great necessity of every possible precaution being taken to guard against fires; but when all precautions have been taken it is almost impossible to eliminate all risk of danger by fire. One would think that here would be an opening for some enterprising fire insurance company.

“The fruit industry does not appear to receive much attention from residents in this district, and I do not think that anyone can be blamed for not devoting much time to an industry which, even in the most favoured localities, does not appear to recoup those engaged in it to any-

thing like the same extent as do several other industries, and those who are disposed to venture capital and labour in the production of fruit would, I think, be well advised to try some other industry for their main attention. The export of fruit from Natal this season does not appear to have been attended with very much success, notwithstanding the fact that the Government Entomologist—a capable and trained expert—has devoted much time and labour in giving instructions as to packing, etc.

“A discovery has been made, and an industry started, at Weenen, which promises to be of incalculable benefit to all engaged in agriculture in Natal, but in the adjoining Colonies, and if all that is claimed for the Weenen Phosphates is justified we may congratulate ourselves that we have in Natal something that is of more value to the country than a gold mine. We might all of us, I think, give these phosphates a trial and so satisfy ourselves as to their merits, and here I might offer a suggestion whereby this Association might be of advantage to its members, and that is that we send our united orders through this Association, for by so doing, and ordering a large quantity of stuff, we might get it at a reduced rate.

“When travelling about the country it is very gratifying to observe the evidences of progress and enterprise that are to be met with on many farms. It is now, I am proud to say, quite a common thing in our district to see either steam or oil engines doing the work that was previously done by oxen and other draught animals. In fact, not only doing this work, but being used to do work that formerly was not done at all on the farms. This may in some measure account for the falling away of the miller’s trade. For mealies, instead of being transported great distances to the mills and being brought back equally great distances in the shape of meal and other manufactured stuff, are now prepared on the farm for local consumption, which must undoubtedly effect a very great saving in every way for the farmer, and it must be very gratifying to him to thus reap the reward of his energy and enterprise.

“During the past year Native labour in this district has been sufficient for all requirements, and in this respect I think we are very fortunate.

“Now, gentlemen, I must conclude my remarks by thanking you for your attendance here to-day, and also by thanking your Secretary for the able manner in which he has discharged the duties of his office. I would like, however, to take this opportunity of welcoming to our district our old and esteemed friend, Rev. J. Scott. I am sure you will all agree with me that he will be an acquisition to the district, and possibly he may, by his energy and enthusiasm in all things pertaining to agriculture, inspire a little more life and energy into our Farmers’ Association.”

NEW HANOVER.

The annual general meeting of the New Hanover Agricultural Association was held at the Agricultural Hall, New Hanover, on Wednesday, 15th September, 1909, at 10 a.m.

The minutes of special general meeting held on 19th April, 1909, were read and confirmed.

The President's report for the year was read and adopted. It was as follows:—

"The Association is now in its sixteenth year, and there are at present 80 members on the roll.

"During the past year two special general meetings and various committee meetings were held.

"The agenda of the Natal Agricultural Union was the chief business dealt with at the special general meetings.

"*Show*.—The usual steps were taken to make arrangements to hold a Show in July. A special fund was opened to provide for the payment of prizes and the incidental expenses of the Show. It was found, however, that the fund was not being subscribed to in a measure sufficient to meet the purpose for which it was opened, owing, no doubt, to a considerable extent to the losses suffered by farmers through East Coast Fever. It became clear that if the Show were held, it would be necessary to draw upon the general funds of the Association to meet the payments that would require to be made. The Show committee, after carefully considering the situation, decided that, under the circumstances, it would not be wise to proceed further with the arrangements for the Show, more especially as the sum owing by the Association on bond over the hall and grounds amounted to £475, and the Show committee accordingly took the responsibility of abandoning the Show.

"I am sure that you will feel that the action of the Show committee was a prudent and proper one in the circumstances, and that you will approve of it.

"*Bond*.—When the Show was abandoned the general committee sat and decided to reduce the bond by a payment of £125 from the general funds of the Association, which payment of £125 in reduction of the bond was accordingly made, so that at the present date the bond stands at £350.

"*Our Hall*.—During the year, the general committee of our Association authorised an expenditure of not more than ten pounds on repairs to the hall. The hall committee very efficiently framed a specification of the work to be done, and saw it carried out. The hall is now much improved.

"*East Coast Fever*.—Our division is now pretty well honeycombed with the disease, though there are some farms still clean. It is our duty

to do our utmost to prevent cattle from infected farms being brought on to, or driven through, clean farms.

"*Wattles* are doing well, and the price is favourably sustained. Owing to the late autumn rains most farmers were able to strip all through the year.

"*Mealies*.—The past season's crop has been a good one, and it is gratifying to know that the quality of Natal mealies has enabled them to maintain their deservedly high reputation in the European market. It is in our best interests, that no pains should be spared to make certain that the high standard of quality is preserved.

"The Natal Agricultural Union has done good work during the past year. The report of the proceedings of the annual Conference held in April last, issued by the Union in printed form, is an interesting and valuable document, showing, as it does, the ideas and views of farmers in all parts of the Colony.

"I thank the office-bearers and members of the Association for the assistance they have given me in carrying out my duties during the past year.

"In conclusion, I think I may safely say that it is the earnest desire of all of us that the new era now dawning in South Africa will bring genuine happiness and true prosperity to all."

The Treasurer's report showed that, after paying £125 in reduction of the bond over the Association's property, and after paying £10 2s. for repairs to the hall, and all other expenses of the year, a credit balance of £34 8s. 11d. remained with which to commence the ensuing year.

It was moved by the Rev. James Scott, seconded by Mr. Jno. Christie Watt, and carried unanimously, "That the office-bearers who held office during the past year be, and are hereby, re-elected for the ensuing year."

DRONK VLEI.

An ordinary meeting was held at Creighton on the 13th September, when there was a moderate attendance. The President was in the chair, and, in the unavoidable absence of the Secretary, Mr. A. Hodson, his duties were undertaken by Mr. E. Marriott.

A strongly-worded resolution, drawing the attention of the Minister to the necessity of enforcing the inclosure of unfenced farms, and pointing out the remissness of Advisory Committees in this regard, was carried unanimously.

It was notified that the Government Wool Expert would visit the district some time in November, and give a demonstration of the correct method of classing and packing wool at Mondri.

Some dissatisfaction was expressed at the decision of the Natal

Agricultural Union to increase the subscription payable by affiliated association, as the sum now demanded would absorb more than one-third of the revenue of the Association.

Correspondence *re* the charge of one penny per 100 lbs. for goods and one shilling per head for live stock loaded or off-loaded at Mondri Siding was read and discussed. The meeting considered the action of the Railway Department in thus trying to cover the cost of the siding, which, under better conditions would bring increased traffic to the line, most unjustifiable; especially when taken in conjunction with the high rates charged between Mondri and Creighton.

The question of the management of the cemetery was brought up for discussion, but it was decided to refer it to a public meeting.

UPPER BIGGARSBERG.

The President of the Upper Biggarsberg Farmers' Association read the following report at the annual meeting of the Association, which was held on the 24th September:—

"Gentlemen,—In presenting the ninth annual report of this Association I regret to again have to record a season more or less disastrous to the majority of its members. Owing to the abnormal rainfall experienced during the whole summer both the mealie and potato crops were in many instances failures, and there appears to be little doubt that the majority of the farms in this district are able to withstand drought better than excessive rains.

"The stock farmer has also had his share of ill-fortune, the percentage of deaths in herds of cattle being considerably above the average, owing, so far as my information serves, to the great increase in quantity of ticks, which is surely an efficient reason to induce the owners to cleanse their cattle either by dipping or spraying them. Sheep also have had a bad time of it, bluetongue accounting for many deaths, and wire-worms have also had a longer period than usual in which to devastate the flocks.

"I have now inoculated merino sheep with anti-bluetongue vaccine for the last three years, and have always had satisfactory results.

"The position with regard to East Coast Fever is practically the same as it was one and two years ago. During the early part of the year all movement of cattle other than slaughter cattle was prohibited, and the power of issuing permits previously exercised by the Advisory Boards was cancelled by the Minister of Agriculture and relegated solely to the Veterinary Department.

"So far as is known the district is still clear of the disease, but it is a constant menace, and the cattle-owner will be wise who provides

as many paddocks as possible in which to temperature and move his cattle should an outbreak occur among them.

"Considerable difficulty is being experienced in getting produce to the railway, and the cost of transport has considerably increased the debit side of the year's expenses. So far as I am aware the Government transport has not been used in this part of the district, and one gets the impression, whether correct or not, that it is not really intended that it should be available except at prohibitive rates.

"Mr. Langley and your President attended the meeting of the Agricultural Union in April, and your resolutions, with one exception, were carried by large majorities.

"At the same time they had an interview with the Minister of Agriculture and urged him to open the district for the months of May, August and September to ox transport, but without success. Your President interviewed the General Manager of Railways when he was at Dannhauser and stated the need that existed for a better local service of trains. Since that interview the service has been infinitely worse, and few farmers use the railway to travel on if they can avoid it. An agricultural show was held at Newcastle in June which sadly lacked support from the farming community, and this district was, I believe, solely represented by a few sheep. It is to be hoped that the next show held there will see a considerable quantity of produce exhibited from this district.

"The business done by the Association during the past year has been practically nil. An endeavour was made to hold a stock sale in December, but proved a failure owing to the impossibility of offering cattle.

"No tenders were called for fertilisers or grain bags, as there appeared to be no desire on the part of members that such should be done, the reason being probably that many are members also of the Natal Mealie Growers' Union and made their purchases through it, and also that the principal firms dealing in fertilisers send their representatives through the district, who are keen in booking orders from the individual farmers.

"I believe it is owing to the above conditions that interest in the Association has to some extent been lacking during the past year, and I trust the incoming office-bearers will conceive the advisability of again undertaking this branch of its usefulness, and also endeavour to get members to realise that it is only by co-operation that a community can progress. In conclusion, I thank our hon secretary for his work during the year and those members of the Association who have attended the meetings, and I trust they will continue their support to the Association during the coming year."

Epizootic Lymphangitis.

By W. M. POWER,
Chief, Veterinary Division.

THIS disease, though known for a long time in other countries, did not gain entrance into South Africa until the Boer War. Cases have since been met with in all the Colonies; in fact, towards the end of the campaign it was fairly prevalent in many parts of the country, though in Natal it has until recently been almost entirely confined to the North Coast, where on some of the sugar estates it has now unfortunately obtained a firm foothold. As far as we know, the disease only affects equines, *viz.*, horses, mules and donkeys. It is a very virulent disease, due to the presence of a specific organism, and characterised by a discharge of pus (matter) from the lymphatic vessels of the skin and those underneath it.

The symptoms are usually found on the skin, closely resembling Glanders (Farcy) and may be observed almost on any part of the body, but they are most frequently met with on those parts which are most exposed to injuries from kicks, harness galls, etc., and are as a rule at first noticed as small sores or ulcers (one or more) on the legs, shoulders, neck, ribs, etc. The sore appears in its early stages as a bud or pimple; it then burts and discharges a yellowish pus. Other sores may make their appearance near the first one, and frequently appear to be arranged in line, this being due to the fact that the infection follows the course of the lymphatic vessels.

In advanced cases these sores or ulcers may become very numerous, and in the hind limbs they may extend from the fetlock to the groin, apparently covering the whole of the inside of the leg; there may or may not be a discharge from the nostrils. In mild cases there is no systemic disturbance, the animal apparently being quite healthy except for the presence of a few ulcers on the skin. It is unfortunate that such should be the case, as very often, where the owner or the driver has had no previous experience of the disease, the ulcer does not arouse suspicion, but is treated as an ordinary slight wound, the animal is continued to be worked with the rest of the span, and in this way the disease may be spread from one animal to another by direct contact, or by the harness, stable utensils, whip, etc. As mentioned above Epizootic Lymphangitis closely resembles Glanders, but it may be distinguished from it by certain symptoms and microscopical examination of the smears prepared

from the pus of the ulcers, and also if necessary by the application of the Mallein test.

With regard to treatment, I may say that some cases are curable if proper treatment is adopted in the early stages, and then only if the primary lesion is not situated near a joint or in close proximity to any important blood vessel. To be successful complete excision of all the diseased tissue must be carried out, and it is most essential that the after treatment of the wounds be attended to in the most thorough manner, that is, by the application of suitable dressings, and constant examination, in order to ascertain if any further infection is present at or near the seat of operation. It frequently happens that the lesion may have apparently been successfully dealt with, and the wound heals, but after an interval—which may extend to many months—ulcers appear near the original lesion or on some other part of the body, so it will be understood that if every particle of diseased tissue is not removed the infection remains as a source of danger to other animals, and may also be carried in the lymphatic stream to other parts of the body.

The fact that although a case may be apparently successfully dealt with by operation, etc., and still retain infection in the body to develop the disease at a later date (many months afterwards), certainly weakens the system of attempting to eradicate the disease by surgical means. Owing to the long period of incubation, which may be anything up to twelve months, special caution is required in regard to in-contact animals; such precautions include systematic inspection and quarantine, and should any lesions be observed, no matter how small, the animal should be isolated until a definite diagnosis can be made. In order to prevent the spread of infection, rigid disinfection of premises, harness and anything that has been in contact with the animal must be carried out; even whips, hands and clothing of assistants should receive attention. In some cases, such as badly constructed, old wood and iron stables, it is necessary to destroy the buildings in order to ensure thorough disinfection.

It will be seen that the eradication of the disease in a country like this and with a limited staff is not an easy one if undertaken by attempting treatment of the affected animals, and I am therefore of opinion that the most economical means of dealing with the disease is to destroy all the clinical cases, quarantining and systematic inspection of all the in-contact animals with a thorough disinfection of the premises, etc. We have authority under the Epizootic Lymphangitis Act to deal with the disease in this manner, and at present all clinical cases are being destroyed, and the quarantining and inspection of in-contact animals is being carried out as efficiently as possible in Natal, and I hope we shall be able to make the same arrangements for Zululand at an early date, as

several outbreaks have recently occurred in this Province as well as in Natal.

I regret I have been unable to obtain some good photographs of animals suffering from the disease, as I wished to have them published in the *Journal* with this article, but I hope it will be possible to obtain some in time for the next number. The frontispiece in the present issue, however, will give some idea of the appearance of the disease, although the case depicted is an advanced case.

Correspondence.

ENQUIRY *RE* PIPE CALABASHES.

An East Griqualand correspondent writes asking if there is any sale in Natal for pipe calabashes. Should any of our readers desire to get into communication with our correspondent we shall be glad to furnish his name and address.

BARBERRY TALLOW.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—We would esteem it a favour if you will kindly let us know where Barberry Tallow is obtainable. This tallow is not known in Dundee as far as we can gather.—Yours, etc.,

HONEYWILL & TAYLOR.

Glencoe Junction.

The only time when it's proper to be a dead man is when the undertaker comes to try on your new harness.

In terms of No. 2 (a) of the Regulations made under Ordinance No. 4, 1853, and published under Proclamation No. 58, 1903, the Indhloveni Forest, bounded southward by Lot A 104 and otherwise by Lot FP 269, in extent 76 acres, in the Polela district, having been surveyed, has been declared to be a demarcated forest within the meaning of the regulations in question. A plan of this forest is now lying in the office of the Director of the Division of Agriculture and Forestry, Cedara.

THE FARMER BOYS' PAGES.

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Conducted by "ARATOR."

** * Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.O. Editor, "Natal Agricultural Journal," Maritzburg.*

"Arator" to His Friends.

THIS month I have three inquiries to answer in these pages, and I am glad that readers have made a start. I hope these will be followed by a number every month. My first letter is from a correspondent at Makowe Mission Station, in Zululand, who writes me as follows:—"Dear Sir,—I am glad to notice the new 'Farmer Boys' Pages' in the *Agricultural Journal*, for on this station I have a lot of farm work to do and as yet have had no experience on a farm, and shall be most glad of your help from time to time. There is a lot of ground here where sweet potatoes have been raised and the ground neglected after, so that it is full of small potatoes and tops. What is the best way to bring this ground into good condition again? We have no manure, only having donkeys on the place. Could you give any advice on the best way of growing sweet potatoes? I shall take great interest in the 'Farmer Boys' Pages.'"

* * *

In answer to my correspondent's question regarding the clearing of ground where sweet potatoes have been grown and which ground has been neglected, the easiest way is, if you have any pigs, to turn them on to the ground; they will be about the best means of clearing it. If that cannot be done, then plough the land as deep as you can, and after that cultivate it as thoroughly as possible. Then plant a crop of beans or roots—in fact, any crop that is usually planted in drills;—then with frequent hoeings the sweet potatoes can be kept in check and finally

eradicated—which could not be done if an ordinary broadcast crop were planted.

* * *

My next letter comes from the O.R.C. "V.G.B.," who has a question to ask with regard to the instalment of lightning rods, writes:—"I was very much pleased to see you had started the PAGES, which I much appreciate. They are very interesting and to the point. You invited anyone who might want something explaining to write to you, and I am now taking advantage of your kind offer. The question is not so much to do with farming as it is to do with the safety of farmers. I refer to lightning rods. Can you tell me about them? We have put up a long piece of twisted wires (two) on the top of which is a foot or so of copper wire also twisted. The galvanised wire has been led down the wall and in a trench some distance away. Will it be at all effective? One side of the house has a hip roof. I don't think the way the other side has been done will act on the hip roof, because some of the wire will have to be brought down the roof iron: will the lightning be more likely to run down the wire or go into the iron? It will be attracted by the copper piece, will come down and then some will go down the galvanised wire and some into the roof. Is that correct? If it is, some other method must be devised. If suitable conductors cannot be constructed at home, we must, of course buy some. I hope you can understand the difficulty of the hip-roof. My idea is that the electricity would just as soon go into the roof-iron as travel down the wire. If the wire was copper, then it would prefer going down that, wouldn't it?"

* * *

"V.G.B." touches on a matter that is rather out of my line, but I think I can answer his question satisfactorily. You must understand that the earth is a large storehouse of electricity, and that, during a thunderstorm, the electricity that is in the air seeks to connect up with the electricity in the earth. This it is able to do more rapidly through the pointed prominences on the surface of the earth, such as trees, houses, posts, riders on horseback, and even through umbrella sticks, as well as through many other similar agents. Of course, whatever the electric fluid passes through, unless it be of metal, it tends to destroy, either partially or wholly. Now, to save brick houses from destruction by lightning, what are termed lightning conductors are, as you know, made use of, and they are used for this reason, that metal is a better conductor of electricity than any other material, and consequently the destructive current, which is received by means of the brush or point at the top end of a lightning conductor passes down through the *conductor* to the earth rather than through the building itself. According to your letter, you are doubtful as to whether the electricity will go down the iron roof of your house instead of running down the wire. You

must, however, remember that the roof is situated on brick or stone walls, but in any case the wire serves as a quick direct communication with the earth, and the current will by preference pass through that wire rather than running all over the roof and through the walls of the house, whether they are of brick or galvanised iron. Of course copper is a better conductor of electricity than iron, but iron wire will do quite well enough.

* * *

"Amateur," writing from Bremersdorp, asks: "Is it possible to know how far we can drive nails or staples into trees, or even hang a gate, without doing them damage, or killing them."—You must realise that nothing in nature stands still, and more especially so trees, so that a gate hung in the way you suggest would be a very strange fit after one growing season. It would take a very large number of nails to kill a tree, but of course the practice of driving nails into growing trees is inadvisable from a timber point of view. How far a nail, or staple, may be driven into a tree depends, of course, on how large the tree is. If the tree is of a good size, moderate length nails will not kill it or do it any damage, except, as I have said, that the timber value of the tree will be lessened thereby.

* * *

I hope that next month I shall have still more letters to deal with, for I want readers to make free use of these PAGES for inquiries, as well as for interchange of ideas and experiences, comments and so forth. If you have any trouble, if there is any particular point in the articles appearing in these PAGES about which you are not clear, or if you want anything explained, write to me, and I will do my best to help you.

* * *

Address your letter to "ARATOR," care of Editor, *Natal Agricultural Journal*, Maritzburg.

Implements of the Farm.

III.—CULTIVATORS AND HARROWS.

It would be impossible in a series of short articles such as these to give anything like a detailed account of all the different types of implements that are now turned out in each class, and accordingly I do not intend to do more than give a general idea of each class of implement—ploughs, cultivators, harrows, and so on—in order that readers may have a fairly good idea of the general principles upon which the implements of each class, taking them more or less as a whole, are designed. This plan I was obliged to content myself with following in discussing ploughs, and I shall proceed on the same lines in discussing, in the present articles,

the next branch of our subject, cultivators, and in succeeding articles the various other classes of farm implements. The descriptions which I give in this way will be sufficient to enable readers of these PAGES to follow intelligently and appreciatively the series of articles on farm machinery on the Natal market which the Editor of the *Journal* is now preparing. These articles will be well illustrated and will embrace practically all the different makes of all the various classes of farm machinery obtainable in Natal.

CULTIVATORS.

The cultivator and the harrow both work on the principle of the ordinary garden rake; the harrow is, in fact, a rake on a large scale, but the cultivator is really more perfect in its action, since it stirs the soil to a greater depth. Indeed land is sometimes prepared by means of the cultivator without using the plough at all. For instance, many farmers consider its use in this way preferable in the case of land off which turnips have been eaten (*e.g.*, by sheep) and on which it is desired to sow barley. The sheep, of course, leave a considerable amount of manure on the land, and by using the cultivator instead of ploughing the land for barley crop the manure remains near the surface of the soil. Also, in the use of steam power, the cultivator is held by some to be preferable to the plough in breaking up stubble.

In order that the ordinary use of the cultivator may be understood, it may be said that this implement takes the place of the hoe. What is called the "horse hoe" belongs, in fact, to the cultivating class of implements. All the various implements designed for cultivating—that is for loosening the surface soil for the purposes of destroying weeds, admitting air into the soil, and retarding the evaporation of the moisture in the soil by providing a "mulch," as it is called, of loose earth—are constructed upon the same general principle. A number of teeth, called "tines," are uniformly arranged and fastened to a frame which is carried on one or more wheels; and as the implement is drawn along the rows of growing plants, the points of the tines are dragged through the soil between the rows at a depth of a few inches. The tines are furthermore so arranged as to loosen the soil over the whole surface, and they are made in different shapes to meet the varying requirements of the work.

Cultivators are made of all sizes, and can be had for loosening one row at a time or for dealing with a number of rows. There are also cultivators made for various special crops. We also see various forms of harrows used for cultivating purposes. The ordinary tooth harrows can, of course, only be used whilst the plants are very young, otherwise, in dragging the implement over them, damage would be done to the crop. The disc harrow, however, in one of its forms, is often used for lucerne, after it has been cut; but in this case the implement is used

not so much for cultivating (although it does accomplish this to some extent) as for splitting the cut stalks of the plants for the purpose of promoting greater growth.

HARROWS.

The word "harrow" is derived from the Old English *hyrwe*, "to tear up." Strictly speaking, cultivators should be called harrows also, if we are to follow the meaning of the Old English word.

The harrow, as I have said, is, in its best known, ordinary form, but a rake on a large scale drawn by animals; and its purposes are to pulverise the surface of the land after ploughing, to clean land that has been ploughed or cultivated by bringing weeds to the surface, and to cover the seed after it has been sown. The teeth or tines are regularly arranged, and in such a way that each tooth cuts a fresh track of its own, no two tines following the same track. The tines are fixed to frames, in rows (usually there are five rows and about twelve tines in each row), and are hitched on to a long bar and dragged over the ground without any wheels.

In the ordinary harrow the teeth drag perpendicular to the surface of the ground. There are other harrows, however, in which the tines are placed at an angle, the ends pointing in the direction in which the implement is travelling; and some again have tines very much after the same style as some forms of cultivator tines. Other harrows again not only have cultivator tines, but are also mounted on wheels—as instance Howard's self-lifting wheel harrows and Clay's improved drag harrows on wheels. Another form of harrow is that known as the Norwegian, which, instead of having immovable teeth, is constructed with three rows of revolving star-teeth—that is to say, each tine-piece consists of a "star" of four, five, six, or seven teeth, which revolve as the implement moves. The machine is mounted on wheels and in the improved forms the elevation and depression of the tines is controlled by a lever. This type of harrow carries us naturally on to the disc harrow. Here, instead of revolving star-shaped tine-pieces, we have revolving discs. These discs are usually concave in shape, but in some makes they are flat. The discs are in two sets, which can be placed at any desired angle in relation to each other for working. As the discs revolve they lift the earth, and even, to some extent, invert the soil to the depth they cut. They are useful labour-saving implements and work very efficiently. For clay soils the discs are made with sections cut out at intervals around their circumference, in order to prevent the soil from clogging, as it would do in the case of the solid discs.

The chain harrow is a variation of the ordinary tooth harrow, which we may notice in passing. This form of harrow is very little used—if used at all—in this country. It is only serviceable for surface action, such as for lightly covering seeds or for spreading manure on grass land.

A Chat about the Soil.

III.—THE PHYSICS OF THE SOIL.

Now we come to learn something of the Physics of the Soil—that is to say of the sizes of the particles of the soil, porosity, texture, tenacity, retentiveness, weight, odour, colour, movement of soil moisture, temperature, and so on. We have got an idea of what the soil is, how it was formed, etc., and we have now to study the relation between the character of the soil—using the word in its broadest sense—and farming. We will begin with a consideration of the size of the particles of which the soil is composed.

Upon the question of the size of the particles of a soil depend many characteristics, such as texture, tenacity, absorptive power, and so on; and besides this, the average size of the particles which go to make up a soil has much to do with the quality of the crops grown. Some interesting discoveries in this connection have been made of late years by American investigators. According to Primrose McConnell, who quotes some of the figures given by American scientists an ordinary class soil is estimated to contain 400,000,000,000 particles per ounce, while a good maize soil has about 280,000,000,000 particles. It is stated that soils with 250,000,000,000 to 300,000,000,000 particles per ounce are adapted for potatoes; 350,000,000,000 to 450,000,000,000 for onions, and so on.

Generally speaking, the finer the particles of a soil are, the greater will be its fertility; and the reason for this is the simple fact that, where the soil is fine, the roots of a plant will come in contact with more of it than if the particles are larger. At the same time, the finer a soil is, the more does it need frequent cultivation, in order to allow air to enter and to allow the roots to spread more readily.

Some soils we hear described as porous; others are spoken of as dense. The degree of porosity of a soil is dependent upon the sizes of the particles that go to make up that soil—not on the sum of the spaces between the particles. For example, we learn that clay has a pore space of about 50 per cent. (judging from the amount of water this kind of soil will hold), while a coarse sand may have a pore space of only 25 per cent., yet sand is more porous than clay because it allows water to percolate through it more readily than does a clayey soil, the individual spaces between the particles being larger in the former than in the case of the latter.

Soil texture is another matter that calls for discussion. The texture of a soil is very closely connected with the proportion of “proximate constituents” (sand, clay, lime, humus, stones, etc.), present. For instance, an open texture in the soil is due to the presence of a large

proportion of gravel or sand, while closeness of texture is due to a relatively large proportion of clay. An open soil does not hold water well and has little tenacity, but it is easy to cultivate; while on the other hand a close soil is difficult to till, is tenacious, and allows water to percolate very slowly.

Soil that is composed of more than half clay will be very tough. In dry weather it will be liable to set hard and crack, and when an attempt is made to till it, it will be cloddy and lumpy. Soil that has too great a proportion of clay should have lime added to it, which will make it crumbly and friable and so easier to cultivate.

The texture of a soil may be greatly improved by dressings of farm-yard manure (which, of course, besides enriches the soil from a fertilising point of view); whilst another good plan is to "green manure"—i.e., grow a forage crop like soy beans, cowpeas, rape, mustard, and so on (articles on this subject will appear in these PAGES in due course) and plough them under in the green state. This mass of vegetable matter decomposes, becoming humus in time and so doing much good.

The action of frost, however, for the temporary improvement of soil texture, takes a lot of beating. When land is to lie fallow during the winter it is greatly improved by ploughing it in the late autumn and leaving it thus for the disintegrating action of the frosts of winter. The frost freezes the particles of moisture in the clods of soil, and the consequent expansion of the moisture serves to break up the soil, so that, by the time the spring comes, the ground is greatly improved as regards tilth and is easy to bring into condition for seed sowing.

Soils are often spoken of as "light" or "heavy." These terms have nothing whatever to do with the actual weight of the soil, but refer to the degree of tenacity that the soil possesses. A sandy soil, for instance, is called "light," and this is because such a soil is easily cultivated: the draught necessary for ploughing is relatively *light*. A clay soil, on the other hand, requires *heavy* draught power, and so is spoken of as "heavy." The tenacity of a soil is, of course, its degree of stickiness: the more sticky a soil is the heavier it is to work. There is a surprising difference in the tenacity of soils. Some require as much as five times the power required to pull a plough through them at the desired depth that lighter soils need; but, of course, the more a soil is worked the less tenacious it must become.

It should be noted that sandy soil is most tenacious when it is wet and least so when it is in a dry condition; whilst on the other hand a clay soil is least tenacious when it is wet and sets into a hard lump when it is dry. When a clay soil is in a wet condition it is advisable not to cultivate it, on account of its tenacity to "puddle," by which the possible tilth will be destroyed.

(To be continued.)

Agricultural Chemistry for Beginners.

By ARCHIBALD PEARCE.

CHAPTER II.

HAVING somewhat cleared the ground, we shall now proceed to describe two of the elements named, selecting Oxygen and Hydrogen first, because they enter into the composition of so many other substances, and in describing them we shall pave the way for the understanding of certain important classes of their compounds.

OXYGEN.

Oxygen is a gas which is so widely found in Nature that in the free or uncombined state and in its compounds it forms about half the entire weight of the world. The air we breathe consists chiefly of a mixture (not a compound) of oxygen and another gas called nitrogen, the former making up about one-fifth of the total volume; eight-ninths of water by weight is oxygen; and it forms a greater or lesser part of the majority of the rocks of which the earth is composed. It is a very active element, combining readily with most other elements, and the compound formed when oxygen unites with another element is called an *oxide* of that element. Thus the oxygen of the air combines with iron, forming iron oxide, which we know by the name of rust; oxygen and phosphorus form phosphoric oxide; oxygen and calcium, calcium oxide or lime; oxygen and hydrogen, hydrogen oxide, which is water. It is the oxygen of the air that enables things to burn; the burning of a candle, for instance, is in fact the combination of the oxygen of the air with the carbon and hydrogen of the grease. The various oxides are of great importance, and some of them will be referred to later on.

HYDROGEN.

This element is another gas, and the lightest of known substances, being fifteen times as light as air. The next time we want to make "killed spirits" for soldering, let us put the pieces of zinc and spirits of salt into a wide mouthed bottle (not too large), and cover the mouth loosely with a piece of paper. After the effervescence has proceeded for a few minutes, apply a light to the mouth, and we shall either get quite a loud pop, or a bluish, almost invisible, flame will burn at the mouth of the bottle. The gas which causes the effervescence is hydrogen: if it has completely filled the bottle it will burn quietly, if it is still mixed with air it will explode. In both cases the application of flame has caused the hydrogen to combine with the oxygen of the air and form water, which is, as explained above, the oxide of hydrogen.

ACIDS AND BASES.

We shall now be in a position to understand the constitution of a large and important class of compounds termed acids. These are distinguished by a sour taste like vinegar or lemon-juice, by the power of reddening paper dyed blue with litmus (a colouring matter extracted from certain kinds of lichen), and *by always containing hydrogen that can be replaced by metals*. For instance, sulphuric acid consists of hydrogen, sulphur, and oxygen; if the hydrogen is expelled and its place taken by iron, so that the new compound contains iron, sulphur and oxygen, we get what is called a *salt* of iron and sulphuric acid, to which the name of iron sulphate is given, and all compounds of metals derived in this way from sulphuric acid are called sulphates of those metals. Similarly, nitric acid contains hydrogen, nitrogen and oxygen; if the hydrogen is replaced by the metal sodium we get sodium nitrate (nitrate of soda), and all such derivatives of nitric acid are called nitrates. In the same way, from phosphoric acid we obtain salts called phosphates: from carbonic acid, carbonates; from silicic acid, silicates; and from muriatic acid, muriates: the latter acid is, however, now more properly known as hydrochloric acid, and its salts as chlorides. It differs from the other acids named in containing no oxygen. When we were preparing our soldering fluid just now, what really happened was this: the metal zinc turned out the hydrogen from the spirits of salt (which is the popular name of hydrochloric acid) and took its place, forming the salt of zinc and hydrochloric acid, namely, zinc chloride, thus:

We had at first—

Hydrochloric acid and Zinc

composed of

hydrogen
chlorine } and zinc.

What was left was

Zinc chloride and Hydrogen.

composed of

zinc
chlorine } and hydrogen.

It is plain that one acid can form a number of different salts, according as the hydrogen is replaced by various metals.

Most acids are formed by the combination of certain oxides with water; thus, sulphuric acid is the result of an oxide of sulphur combining with water; and such oxides have the name of *acid-forming oxides*, or *anhydrides*, given to them. They are chiefly the oxides of non-metals. Most of the oxides of the metals, on the other hand, do not cause the formation of acids, but if they are brought into contact with

acids they produce salts, identically the same as those formed from the metals themselves. In this case, however, no hydrogen is set free, but it combines with the oxygen of the oxide instead, forming water. This will perhaps be clearer if we illustrate the reaction which occurs when iron oxide acts upon sulphuric acid with the consequent formation of sulphate of iron.

Before reaction we have—

Sulphuric acid and Iron oxide

hydrogen	}	and	{	iron
sulphur				oxygen
oxygen				

After reaction we get

Iron sulphate and Water

iron	}	and	{	hydrogen
sulphur				oxygen
oxygen				

Oxides of this kind are called *basic oxides* or *bases*. When so brought into contact with acids they *neutralise* them; that is, prevent them having any action on litmus paper, which is the usual test for the presence of an acid. This is expressed by saying that most salts are neutral to litmus; this rule, however, has a good many exceptions.

Below are a few simple questions on the foregoing, to enable anyone to test his grasp of the subject so far.

1. The ancients used to call earth, air, fire, and water the four elements. Were they right in so doing?
2. What are the chemical names of water, lime, spirits of salt, iron rust?
3. What weight of oxygen is contained in 36 lbs. of water? How much in 10 cubic feet of air?
4. Explain exactly the connection between an acid and a salt.
5. If calcium oxide were acted on by sulphuric acid, what substances would you expect to be formed?
6. Mention two other names by which hydrochloric acid is known.
7. What is meant by a sulphate?
8. Why is hydrogen sometimes used to fill balloons? If you were asked to make some, how would you proceed?
9. How would you try and find out whether a certain soil was acid or not?

(To be continued.)

Sheep Notes.

IT takes blood to feed sheep ticks, and blood is too costly to be used in this way; dip for ticks regularly without fail.

Take a pride in your flock, and remember that in this, as in other branches of farming, what is worth doing is worth doing well.

Wean the lambs at four to five months old, and give them the freshest pasture on the farm, and keep clean water and salt within their reach.

Choose a ram with a strong head, neck and back; broad chest, strong and well-set legs; a fine, dense and even fleece, and true to the best type of the breed.

Poultry Notes.

A LUSTY crow, an active step, and wide-awake appearance in a cockerel are indications of vitality.

There is only one way to have pullets mature early, and that is to keep them growing.

Board floors in the chicken-house are better than wet ground, but dry ground is best of all.

Chicks are always stronger, and hatches come off better if the hen is absolutely undisturbed while hatching.

Chicks coming from healthy, vigorous parent stock, when surrounded by proper conditions, are bound to grow and mature in fine condition.

Pig Notes.

KEEP the young pigs growing thriftily.

A breeding boar should not be kept fat. This is a very unnecessary condition.

Because pigs are thin and have large frames it does not necessarily follow that they will feed well.

Every check or halt in the growth of a pig through its first two months is more expensive than at any later period.

A sow with a mean, cross disposition is always hard to deal with, and often causes the loss of the litter.

One advantage with dairying in connection with pig raising is the supply of milk that can be had for the growing pigs.

Grit for Fowls.

A fowl kept without grit is in exactly the same position as a man without teeth, and indigestion is inevitable. Now indigestion is one of the primary causes of liver disease in poultry. Furthermore, it will be obvious that if the food swallowed by a fowl is not properly digested, a proportion of the egg-forming constituents contained therein will be wasted: it follows, therefore, that a supply of good hard grit is conducive to increased egg production. Sand is useless as a substitute: it is neither large enough nor hard enough. The proper-sized grit for a full-grown fowl is about the size of a pea, and angular and sharp as possible.—A. RHODES, in the *London Agricultural Gazette*.

Weathering of Soils.

READERS who have been following the articles in these PAGES on Soils will be interested to read the following extract from *The Agricultural News* of Barbadoes, on the rate at which "weathering" takes place:—

From the point of view of soil formation, the rate at which the rocks of the earth are broken down by atmospheric agencies into particles small enough to be classed as soil, that is by weathering, is an important consideration. Observations recently made on the continent of Europe go towards giving an answer to this question. In Austria it was found that in certain ruins, during 500 to 600 years, there had formed from limestone a layer of soil 4 inches thick and containing 44 per cent. of humus, while the surrounding natural soil, also resting on limestone, was about 16 inches thick and contained 7.7 per cent. of humus. If this was formed at the same rate as that on the ruins, 2,400 years must have been required for the purpose. Similarly on a fortress wall built of limestone, in the Crimea, the soil accumulation in 600 years was found to be 4 inches thick, while the depth of that on the adjoining land measured 26 inches, so that on the same basis, it should have required 3,900 years for its formation.

The General Manager of Railways announces that, with effect from the 1st January, 1910, the rate for the conveyance of South African wattle bark in bundles between N.G.R. stations will be the No. 6 S.A.P. "C" rate, plus 10 per cent., subject to a minimum charge of 2d. per 2,000 lbs. per mile.

Coal and Labour Return.

Return of Coal raised and Labour employed at the Natal Collieries for the month of September, 1909:—

COLLIERY.	Average Labour Employed.				Output. Tons, Cw ..	
	Productive Work.			Unproductive Work. ^a		Total.
	Above Ground.	Below Ground.	Total.			
Natal Navigation ..	366	639	1,005	21	1,026	27,156 0
Elandsbaagte ..	284	631	915	12	927	16,288 2
South African ..	131	308	439	59	489	15,044 15
Durban Navigation ..	251	553	804	—	804	11,516 0
Dumree Coal Co. ..	269	533	763	—	763	12,095 6
St. George's ..	214	418	632	—	632	12,089 0
Glencoe (Natal) ..	171	325	496	35	531	10,066 8
Natal Cambrian ..	210	314	524	4	528	9,969 15
Talana ..	116	404	520	15	535	8,430 2
Newcastle ..	81	395	476	—	476	7,613 6
Natal Steam Coal Co. ..	96	216	312	—	312	6,005 6
Hatting Spruit ..	87	142	229	—	229	4,651 4
Hloane ..	91	208	299	20	319	4,401 10
Ramsay ..	79	136	215	13	228	3,511 5
Ballengerh ..	67	96	163	23	186	2,185 6
West Lennoxton ..	51	91	145	—	145	1,629 19
Burnside ..	—	—	—	263	263	59 0
§ Vryheid ..	5	5	10	—	10	35 0
† Vaulbank ..	—	8	8	8	16	14 10
Makatees Kop ..	4	—	4	—	4	5 0
Totals ..	2,567	5,392	7,959	404	8,423	154,736 11
Corresponding month, '08	2,123	4,992	7,115	756	7,871	113,044 6

			Productive Work.			Unproductive Work.	Total, Sept., 1909.	Total, Sept., 1908.
			Above Ground.	Below Ground.	Total.			
Europeans	..	..	197	160	357	71	428	381
Natives	..	..	901	3,321	4,222	212	4,434	4,110
Indians	..	..	1,069	1,911	2,980	151	3,131	3,050

* Cost Charged to Capital Account.

§ August Return.

† Includes August return.

CHAS. J. GRAY,

Mines Department, Maritzburg, 7th October, 1909.

Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal bunkered and exported from the Port of Durban for the month of September, 1909:—

	Tons. Cw.	
Bunker Coal ..	62,378	4
Coal Exported ..	35,125	6
Total ..	97,503	10

Customs House, Port Natal,
18th October, 1909.

GEO. MAYSTON,
Collector of Customs.

Meteorological Returns.

Meteorological Observations taken at Govt. Stations for Month of September, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.).				RAINFALL (IN INCHES).					
	Means for Month.		Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain-fall in 1 day.		Total for Year from July 1st, 1909.	Total for same period from July 1st, 1908.
	Maximum.	Minimum.					Fall.	Day.		
Observatory ..	72.7	59.6	97.9	50.6	6.21	16	1.19	2nd	8.18	5.82
Stanger ..	75.5	58.7	102	49	6.83	15	2.09	2nd	8.87	4.65
Verulam ..	76.5	56.5	103	48	5.27	11	1.45	2nd	7.08	4.29
Greytown ..	73.3	45.5	89	33	3.32	13	.85	2nd	4.77	2.77
Newcastle ..	79.9	38.7	90	28	2.23	4	1.20	3rd	3.88	3.85
Mid-Illovo ..	71.3	52.5	95	40	6.33	15	1.26	2nd	7.55	4.30
Estcourt ..	73.1	46.4	89	33	1.27	10	.39	3rd	2.24	2.41
Umbogintwini ..	73.7	53.8	103	45	6.90	17	1.57	3rd	9.03	—
Ixopo ..	—	—	—	—	4.82	10	.89	3rd	5.77	4.13
Imbizana ..	74.3	56.3	96	47	5.59	9	1.61	3rd	6.76	4.89
Port Shepstone ..	77.2	55.0	89	45	5.91	10	1.45	2nd	7.11	6.20
Umzinto ..	85.8	54.5	93	52	7.74	10	1.73	12th	9.13	4.31
Richmond ..	70.8	49.0	90	37	6.00	17	1.39	2nd	6.99	5.77
Maritzburg ..	73.9	50.7	94	37	4.16	17	.97	2nd	5.66	3.84
Howick ..	72.0	48.4	89	35	3.85	13	.86	2nd	4.61	4.17
Ladysmith ..	78.7	49.5	93	37	1.41	8	.42	2nd	3.18	—
Dundee ..	73.7	53.2	88	39	2.00	3	1.54	3rd	4.69	2.37
Weenen Gaoel ..	81.8	48.7	98	37	1.43	8	.48	2nd	2.89	2.71
Cam erdown ..	71.4	51.4	98	41	4.63	14	.88	14th	5.67	2.27
Krantzkloof ..	—	—	—	—	6.12	17	1.31	3rd	7.35	3.31
New Hanover ..	75.3	51.2	92	38	3.91	13	1.27	2nd	5.02	5.19
Krantzkop ..	78.5	38.7	89	33	2.61	11	1.15	2nd	4.16	2.50
Lidgettton ..	73.5	41.7	90	26	3.88	15	.98	2nd	1.69	1.27
Nongoma ..	71.1	45.7	89	36	2.19	7	.93	3rd	4.09	—
Vryheid ..	82.1	49.0	88	38	1.17	1	.72	3rd	3.08	4.17
Nqutu ..	72.2	45.3	81	35	2.17	1	1.56	2nd	—	2.75
Mtunzini ..	79.9	55.1	87	50	13.02	40	3.70	2nd	19.08	5.99
Hiabisa ..	76.7	53.4	88	50	5.58	8	1.80	2nd	6.71	5.13
Umbombo ..	70.0	55.3	85	47	2.72	9	.74	3rd	4.67	2.94
Empangeni ..	77.2	55.9	100	48	7.02	10	2.57	2nd	11.22	6.01
Point ..	—	—	—	—	7.66	14	1.85	2nd	10.44	5.65
Nottingham Rd ..	69.5	40.0	88	25	2.06	10	.72	3rd	2.75	—
Char estown ..	70.9	—	80	—	.41	4	.18	14th	1.92	2.66
Ngoni Forest ..	69.1	46.8	87	34	5.64	17	1.27	1st	8.21	—
Mahlabatini ..	81.2	46.3	92	31	3.03	8	.78	3rd	4.48	2.08
Bulwer ..	—	—	—	—	3.91	17	.76	12th	4.59	3.00

Meteorological Observations taken at Private Stations for Month of September, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.)		RAINFALL (IN INCHES).					
	Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain-fall in 1 day.		Total for Year from 1st July, 1909.	Total for same period from July 1st, 1908.
					Fall.	Day.		
Adamshurst ..	92	37	3.61	14	0.01	2nd	4.40	3.91
Hilton ..	86	35	4.41	17	0.17	24th	5.38	3.75
P.M.B., Botanical Gardens ..	—	—	4.55	17	1.12	2nd	5.40	4.94
Ottawa ..	—	—	5.74	13	1.32	3rd	7.54	—
Eshowe ..	—	—	7.75	11	2.58	2nd	—	—
Umlhlangeni ..	—	54	5.41	10	1.65	2nd	7.09	—
Equeefa ..	35	46	6.37	12	1.20	18th	7.34	3.59
Umzinto, Beneva ..	—	—	6.24	12	1.45	2nd	7.24	3.07
Umbombo ..	—	—	1.61	5	0.89	2nd	4.15	—
Elandslaagte ..	—	—	2.20	13	0.61	2nd	2.55	2.85
Biet Vlei ..	—	—	4.49	18	0.51	3rd	4.65	—
Cedara—Hill Station ..	86	37	4.37	20	0.85	3rd	5.45	2.32
Cedara—Vlei Station ..	103	40	6.91	12	1.74	2nd	8.77	4.33
Winkel Spruit ..	93.5	37	1.37	9	0.37	2nd	2.70	—
Weenen ..	73.5	41.8	2.53	11	0.43	12th	5.55	4.29
Giant's Castle ..	—	—	—	—	—	—	—	—

Return of Farms at Present under Licence for Lungsickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Caw	Ladysmith	Scab	Mrs. M. J. v d Merwe	Coolfontein
		"	Natives	Roosboom
		"	Natives	aurie's Kraal
		"	H. Raath	Patteni Spruit
		"	Natives	Goedgezicht
		"	A. G. Dannhauser	Riet Kruif
		"	J. C. Buys	"
		"	Natives	Blew Bank
		"	Natives	Phoyhuai
		"	J. Fur, uhar	stewart Park
		"	J. Hyde	Hydeswood
		"	Natives	Kle nfontein
		"	Natives	Roopoot
		"	H. J. Buys	Piet's Hoek
		"	L. J. J. E. Bester	Pootema's Spruit
		"	B. J. Nieuwbar	Tylden
		"	P. Bartlett	Uithol
		"	R. A. Smith	Lombard's Kop
		"	G. B. Jone	Bergveld
A. B. Koe	Portion of Estecourt	"	Schlanders Bros.	Kelvin
		"	R. Mattison	Calcutt
A. C. Williams	Utrecht	"	J. W. Moor	Greenf. rd
		"	J. v d Merwe	Lands End
		"	Natives	Overwacht
		"	P. L. Uys	Town Lands
		"	T. de Jager	Tigerkrantz
		"	Natives	Riet Vliet
		"	D. Hartman	Ro ekop
		"	J. de Winnaar	"
		"	C. Potgieter	Nitkomst
		"	P. Truter	Welgevonden
		"	— Lekhoff	Bate Spruit
		"	Y. Han br dge	Strydfontein
		"	Natives	Vergenoeg
		"	G. van der berg	Politië
		"	Natives	Tamboekieshoek
		"	"	Frieschgewaagd
		"	J. D. Davel	Klipfontein
		"	J. P. Moolman	Moofhoek
		"	J. L. Nel	Tamboekieshoek
		"	N. Fourie	Lan etwacht
		"	L. Tante	Waterhoek
		"	C. van Tonder	"
		"	P. Landman and G.	"
		"	Bezuidenhout	"
		"	K. Cronje	Verbi kop
		"	P. L. Uys	Waathoek
		"	Natives	Eersteling
		"	T. J. Botha	Sandspruit
		"	M. J. J. Groenewald	Vaalsloot
		"	P. Groenewald	"
		"	Natives	Roodkoppes
		"	L. de Jager	Waterval
		"	Natives	Quaggasdrif
		"	G. J. Keel	Ventersplaat
H. Van Rooyen	Babanango	"	T. Uys	Zoetsmelk Ri er
		"	Natives	Verduveld
		"	"	Wellust
L. Trenor	Alfred	"	"	Boutlijst
		"	Yalwayo	Location
		Lungsickness	J. T. Clothier	Whiteliff
		"	Siguma	Lot F
		"	Mquansla	Omega
		"	Spinguan	Hawarden
J. Rulfe	Lion's River	Scab	Incabi	Location
		"	Makerlu	"
		"	Natives	Location No. 1
		"	Arbuthnot, O. C.	Gowrie
		"	G. M. Trickett	Howick Commonage
		"	Geo. Woodhouse	Halliwel
K. Ripley	Intonjaneni	"	W. G. Shaw	Colburne
		"	P. Marais	Make:eeskop
		"	Nkanyazi	Groenkop
		"	T. W. Smith	Oakdale

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT	DISEASE.	OWNER.	FARM.
K. Ripley ..	Intonjaneni ..	Scab	S. Ferriera ..	Diepkloof
C. T. Vaughan ..	Faulpietersburg ..	"	Natives ..	Nineve
		"	F. D. Wilson ..	Town Lands
		"	Natives ..	Freschewa gd
		"	R. Craig ..	B schkraantz
		"	J. B. Itudolph ..	Halb rton
		"	J. M. van Rooyen ..	
		"	J. Viljoen ..	Paapkvil Vlei
		"	C. Webb ..	Paardfontein
		"	J. H. Stadler ..	Padafontein
		"	Mrs. Stadler ..	Rooitekopjie
		"	H. Viljoen ..	Lochkraal
		"	J. H. Potgieter ..	Alt. na
		"	H. Rohus ..	Chevi bek
R. WingfieldStraff rd	Newcastle ..	"	Natives ..	Blauwbosch
		"	J. Dixon ..	Harte Rivier
		"	Augustus ..	Enden Vlei
		"	M. J. Oosthuizen ..	Springbok
		"	T. Lazenby ..	Balli guch
		"	D. Degewaan ..	Tennyson
		"	C. Kennedy ..	Dassiepoort
		"	Natives ..	Connigsberg
		"	Schwikkard & Co ..	Boscobello
		"	Natives ..	Koppie Alleen
		"	E. J. Dicks ..	Essenwood
		"	A. M. Muller ..	Droogdal
		"	A. Towile ..	Majuba North
		"	J. van Rooyen ..	Asvoegskop
		"	O. S. Vogel ..	Norfolk
		"	L. P. de Jager ..	Sluiteldraai
		"	F. R. Muller ..	Leyden
		"	J. J. Duigenmar ..	Langton
C. E. Walker ..	Portion of Estcourt	"	Oates, W. E. ..	Outdale
		"	A. Stuart ..	Glen Stuart
		"	F. H. Kerr ..	Rock Mount
		"	L. Lloyd ..	Hilcote
		"	J. V. Haw ..	Woodleigh
		"	J. Marais Jun. ..	Northcote
		"	Johnson & Clarke ..	Be gons
G. Daniell ..	Vryheid ..	"	Mangulu ..	Hardetaald
		"	Mkelegana ..	
		"	Kuyeze ..	Mooiplaat
		"	Mrs B. Webbe ..	Rustenburg
		"	C. Beneke ..	Langkrans
		"	Mich ..	Greenkop
		"	C. van der Merwe ..	Nooitgedacht
		"	C. van Rooyen ..	Bloemerdal
		"	P. Tredoux ..	Weinansrest
		"	J. H. Lombard ..	Diefontein
		"	H. A. Lombard ..	
		"	A. W. Meyer ..	Kromellurberg
		"	A. Jansen ..	Frauintzicht
		"	J. H. Combrink ..	Goedhoop
		"	Natives ..	Goedgedacht
		"	J. G. Theron ..	Traktaal
		"	J. F. Potgieter ..	Vaalsloot
		"	M. Kungmann ..	Vredehof
		"	Natives ..	Vaalkrans
		"	J. J. Gregory ..	Weltervreden
		"	J. J. Nel ..	Buifort
		"	A. Armstrong ..	Lekkerwater
		"	H. Beukeus ..	Sterkstroom
		"	J. Z. Moolman ..	Klipfontein
		"	F. D. Moolman ..	
		"	G. van der Wenter ..	Tintasi ft
		"	H. Campbell ..	Town Lands
		"	Natives ..	Vaalkranz
		"	A. T. Davel ..	Brackspruit
		"	H. T. Harris ..	Arcadia
		"	Natives ..	Tuta's Drift
		"	B. E. A. Rabe ..	Enyati
		"	M. T. Ferreira ..	Vaalkrans
		"	Natives ..	Waterfall
		"	J. van Rooyen ..	Welkeveden
		"	J. A. K. van Rooyen ..	Rust laats
		"	H. de Brui ..	Bordepoort
		"	C. van Rooyen ..	Rooikop
		"	L. van Rooyen ..	"

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
G. Daniels ..	Vryheid ..	Scab	J. van Rooyen ..	Bedrag
J. R. Cooper ..	Nkandha & Ngutu	"	Natives ..	Selutshana
		"	" ..	Nguta
		"	" ..	Telezi
		"	C. E. Parr ..	Sa dhiwana
		"	H. Muller ..	Ngu u
		"	Natives ..	Mkonglana
		"	" ..	Nondweni
		"	" ..	Matethling
		"	" ..	Hlozagazi
		"	" ..	Dalala
		"	" ..	Magala
		"	" ..	Nqudeni
		"	" ..	Gadalen
		"	" ..	Maweni
		"	" ..	Matethleni
		"	" ..	Halala
E. Varty ..	Western Umvoti ..	"	Westbrook Bros. ..	Dalton
		"	D. C. S. Nel ..	Hig field
		"	J. A. Graham ..	Driefontein
		"	H. Hansmeyer ..	Oures
		"	T. J. Maritz ..	Mt. Alida
J. F. van Rensburg ..	Ngotshe ..	"	F. R. Nel ..	Vernaak' Krnal
		"	Natives ..	Tochygeisnte
		"	J. D. Bester ..	Smaldee
		"	L. Botha ..	Wetervreden
J. Stewart ..	Bergville ..	"	J. Joubert ..	Kondelanger
		"	J. W. Scheepers ..	The Steps
		"	H. Jackson ..	Lytton
		"	Re d Bros. ..	Klaarfontein
		"	G. E. Tatham ..	Nercherley
E. W. Lark n ..	Umsinga ..	"	Oyugmlangans ..	Umsinga
		"	Tshantulu ..	Umsinga
		"	Susezulu ..	Umsinga
		"	Natives ..	Location
		"	" ..	Gordon Memorial
		"	" ..	Vaalkop
		"	T. H. Dedekind ..	Harding
		"	W. W. Strydom ..	Orange
		"	Natives ..	Cr ignillar
		"	" ..	Klippoort
		"	" ..	Umsinga
		"	V. L. Whelar ..	Martens
		"	Natives ..	Uthoek
		"	Natives ..	Myonyona
		"	P. V. Strydom ..	Hill Crest
R. Mayne ..	Eastern Umvoti & Krantzkop	"	Natives ..	Furleigh
		"	" ..	Ematshabolo
		"	P. and H. Mare ..	Speculation
		"	W. Havemann ..	Sophiadale
		"	J. T. Martens ..	Groe kop
		"	J. M. Zietsman ..	Paul's Rest
		"	Natives ..	"
		"	L. G. Nel ..	Glenhoig
		"	Van Rooyen Bros. ..	Wondertonte'n
		"	P. A. Bester ..	De Rust
E. W. Bowles ..	Ixopo ..	"	J. A. Nel ..	Dingley Dell
		"	E. F. Garland ..	Springvale
		"	E. W. Veley ..	Ay hope
		"	Tshe'wana ..	A of S 65
		"	Bohejana ..	Lot K of 5
A. H. Ball ..	Weenen ..	"	J. P. Lotter ..	Berg Vleiz
		"	P. H. Van Rooyen ..	Buffels Hoek
		"	P. P. van Rooyen ..	Doomkloof
		"	Nauke & Lotter ..	Scottshoek
		"	J. T. van Rooyen ..	Belle Vue
		"	J. R. van Rensburg ..	Blinkwater
		"	J. S. Els ..	S ottsburg
		"	E. C. Robinson ..	Mona
		"	S. C. van Rooyen ..	Middelburg
		"	C. P. F. Lotter ..	Waterfall
		"	Vander Westhuyzen ..	Winterhoek
		"	B. J. J. van Rooyen, Sr ..	Bird spruit
		"	L. J. Fourie ..	Scottspoort
		"	P. R. Buys ..	Waterfall
		"	P. H. van Rooyen ..	Buffel's Hoek
		"	T. C. Lotter ..	Waterfall
		"	Natives ..	Belle Vue

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE	OWNER.	FARM.
A. F. Smith (acting)	City, Ungei	Scab	Unveli	Zwaartkop Location
		"	Dria	"
		"	Samuel	"
		"	Jan je	"
		"	Laduma	"
		"	E. Taylor	Taylor's Station
		"	Ramen	Ellis' Estate
		"	J. Henwood	Hilton Road
A. J. Marshall	Dundee	"	B. J. B. denhorst	Kem enveld
		"	H. A. J. Duvel	Kliprug
		"	C. T. Vermaak	Kalderfontein
		"	Natives	Conterfontein
		"	McKenzie & Kruger	Dabray
		"	Natives	Klipport
		"	Geo. Kremer	Dahy
		"	Natives	B. geersgat
		"	R. J. Marshall	Cleveland
		"	J. de Jager	Waschbank
		"	Natives	Blinkwater
		"	"	Hartebeesfontein
		"	"	Goedekens
		"	"	East Hesterion
		"	C. M. Myer, Sen.	Gladstone
		"	R. J. Marshall	Woolands
		"	J. B. Wade	Stanton
		"	C. J. P. Landman	Iro dale
		"	Natives	Kamelboom Kop
		"	G. F. Dannhauser	Cardwell
		"	H. A. J. Duvel	Klipry
		"	J. H. Hatt ng & Son	Hattingdale
		"	J. J. Gregory	Cotswojd
		"	T. C. Koekemoor	Mayhole
		"	N. B. Swarts	Roikop
B. Klusen	Lower Umzimkulu	Lungsickness	Nyapu	Berlek
A. Brown	Polela, Underberg.	Scab	H. Balkie	Inchgarth

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Pound Notices.

NOTIFICATION is contained in the *Government Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :

ON THE 3RD NOVEMBER.

Bulwer—Merino ram, about 10 months old, no brand or ear marks, long tail, probable value, 8s. Impounded on the 16th September by E. D. Stewart, Polela.

Howick—Bay gelding, star on forehead, tail square cut, short, about 14.2, no brands.

Solferino, Gourton—Dark bay mare, rather low in condition ; running at the kraal of Magadeni, in Chief Ndhumbi's Location, Ntabamhlope : black heiter, ear mark under side of right ear.

ON THE 10TH NOVEMBER.

Greytown—Goat ram, black, yellow points, slit in front of left ear, age about 4 years, probable value, 10s. Impounded on the 15th September by W. Torlage, Holmes Dale.

Solferino, Gourton—Dark bay stallion, branded N.C. on near side hind leg, probable value, £18. Impounded on the 28th September by Mr. L. F. Snyman.

Woodstock, Bergville—White Kafir ram, nick in front and slit in back of right ear, probable value, 7s. 6d. Impounded on the 1st October by Natal Police.

ON THE 17TH NOVEMBER.

Dundee—Mare, dark bay, branded "D." off quarter, long mane and tail ; mare, dark bay, blind right eye, long mane and tail, no brands. Both mares have foaled since admission to the Pound. Bay colt, yearling branded "J" off quarter ; eight Merino sheep and four lambs, sheep branded "S" left side, ear marks various. One of the lambs has a peculiar mark, the left fore-leg being black.

Richmond—Black she goat ; two black kids.

Weenen—Running on the farm "Groot Melie uin," and reported by Mr. W. S. W. Harding to be too wild to be driven to Pound : Chestnut filly, about 2 years old, about 12 hands, no brands visible, white star on forehead, right hind foot white.

Woodstock, Bergville—Nineteen white Kafir goats.

ON THE 24TH NOVEMBER.

Muden—Bay stallion, about 7 years old, indistinct brand on right thigh, marks of knee-halter on left front leg, star on forehead, about 12 hands high ; dark grey stallion, about 2 years old, 12 hands high, no marks ; dark bay stallion, about 2 years old, 12 hands high, no marks.

ON THE 1ST DECEMBER.

Ingogo—Reported by the Natal Police, Spitzkop, to be running on the farm "Oakley," as being too poor to be driven to the Pound : Two old Merino sheep various earmarks, indistinct brand. These sheep, it is stated, strayed from a flock coming down from the Orange River Colony some time ago, and have been running with different owners' sheep from time to time ever since.

Ladysmith—Black half grown sow, four white feet and white on snout ; white Kapater Angora goat, right ear swallow tail, right ear square taken out of front ; impounded on the 16th October.

Mount Hope, Klip River—Two dark and one chestnut mares ; chestnut mare star on forehead, two white hind fetlocks, about 5 years old ; black mare, fleabitten, two hind fetlocks white, about 6 years old ; black filly, no marks or brands, about one year old.

Pietermaritzburg—Running on the farm "Kingston," and reported by J. F. Potterill as being too wild to be driven to the Pound : Light brown mule mare, branded D.C., white star on forehead, slit off ear.

Vryheid—Two blue and white she goats with three nicks in right ears, and hole in left ear ; brown and white she goat, with three nicks in right, and hole in left ear ; black she goat, with white face, and three nicks in right ear, and hole in left ear ; white she goat, with three nicks in right ear, and hole in left ear ; white he goat, with nick in both ears.

NOTICE.

The Charlestown Local Board intend to establish a "Township Pound" from the 1st November, 1909, and have appointed Mr. T. G. Whittaker as Pound Master from that date.

Government Cold Stores and Abattoirs.**PIETERMARITZBURG.**

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

	Calves up to One Year old.	Cattle over One Year old.	For minimum number of 250 head per month.		For maximum number of 500 head per month.	
			Under 300 lbs. weight.	Over 300 lbs. weight.	Under 300 lbs. weight.	Over 300 lbs. weight.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1. Receiving per head	0 3	0 6	0 6	0 6	0 3	0 3
2. Killing and Cleaning	2 3	3 6	2 9	3 3	2 6	3 0
3. Labour	0 3	0 6	0 3	0 6	0 3	0 6
4. Disinfectants	0 1	0 1	0 1	0 1	0 1	0 1
5. Bagging (4 Quarters) ... per body	1 9	3 0	2 6	2 9	2 3	2 6
6. Cleaning of Tripes each	0 6	0 6	0 6	0 6	0 6	0 6
7. Chilling of Beef, up to 72 hours or portion thereof per body	1 0	2 9	2 0	2 6	1 9	2 6
8. Chilling of Offal, up to 72 hours or portion thereof per set	1 0	1 0	1 0	1 0	1 0	1 0
Chilling and Freezing Beef—						
9. 1st week or portion thereof per body	2 0	4 6	3 9	4 0	3 6	3 9
10. 2nd " " " " "	1 0	4 0	3 3	3 6	3 3	3 3
11. 3rd and remaining weeks or portions thereof	0 8	3 0	3 0	3 0	3 0	3 0
Chilling and Freezing Offal—						
12. 1st week or portion thereof per set	1 4	1 6	1 4	1 4	1 4	1 4
13. 2nd " " " " "	1 0	1 3	1 0	1 0	1 0	1 0
14. 3rd and remaining weeks or portions thereof	0 9	1 0	0 9	0 9	0 9	0 9

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg,
21st December, 1908.

Farm Apprentices' Bureau.

LIST OF APPLICANTS.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | |
|--------|---------|--|
| No. 2. | Age 15. | Has had 18 months' experience of farming. Understands more about forestry than general farming. Speaks Zulu, and understands Dutch. |
| „ 3. | Age 24. | Colonial born Has a knowledge of bookkeeping. |
| „ 11. | Age 18. | Has had two years' experience on a sheep farm in the O.R. Colony. Is particularly anxious to get back on a farm. Is very willing and obedient. |
| „ 13. | Age 20. | Is an orphan. Is anxious to learn farming. |
| „ 14. | Age 16. | Natal born. |
| „ 15. | Age 19. | Is desirous of learning farming. |
| „ 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. |
| „ 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. |
| „ 30. | Age 18. | Transvaal born Has had experience on a mixed farm. Speaks Dutch and Zulu. |
| „ 34. | Age 18. | Has a slight knowledge of Zulu. Understands carpentry. |
| „ 35. | Age 21. | Has had five years' experience on farms. Understands cattle and horses and Agriculture. Is anxious to get back on a farm. |
| „ 39. | Age 19. | Has had twelve months' experience on a fruit farm in the Cape Colony. Speaks Dutch. |
| „ 40. | Age 24. | Has had a little experience of farm life. Understands bee-keeping. Is anxious to get on a farm. |
| „ 41. | Age 16. | Has not had any experience. Speaks Zulu. Understands carpentry. Has been engaged in a Solicitor's office for four years. Is very obliging and willing. Anxious to get on a farm. |

Epizootic lymphangitis having broken out in Victoria County, a Proclamation has been issued by His Excellency the Administrator declaring the county to be an infected area within the meaning of the Animals Diseases Act of 1894. The removal from that area of any horses, mules or donkeys, whether the same are or are not affected with any disease, is prohibited, except in the case of healthy animals, for the movement of which the written permission of the Chief of the Veterinary Division or of an officer of the Veterinary Department authorised to issue such permits, is necessary. Such permit, moreover, may impose any conditions which the Veterinary Department consider necessary. The penalty for any contravention of this Proclamation is fixed at a fine not exceeding £50, with the alternative of imprisonment, with or without hard labour, until the payment of such fine or for a term of three months.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 115.—Englishman, 26 years of age, steady and an abstainer, with a knowledge of cattle and horses, wishes employment on a farm in Natal (English preferred) as a handy man, with a view to furthering his knowledge of farming in this country. Is willing to accept food and clothing in a good home, for services, for a few months with the prospect of a small wage after the first three months.

No. 116.—Cape man, age 32 years; married, no children. Has been used to working with horses and mules all his life. Has good papers from his previous employers, and was in the employ of the Public Works Department for over five years. Is willing to do anything in his power, but cannot read nor write.

No. 117.—Englishman, 25, of good education, desires appointment as overseer on a plantation in Natal, and would pay a reasonable premium and give services free for a few months if necessary. Has had commercial, engineering, surveying and mining experience.

No. 118.—Pensioner from the Army desires to obtain post on a farm. Is particularly fond of gardening. Has excellent discharge papers and good testimonials.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 121.—Desires open air employment. Age 43. Life experience of agricultural pedigree and prize stock gained in Scotland. Has been six years in South Africa. First-class references and testimonials. Small salary required.

No. 122.—A young man, with life-long experience of cane-growing, desires employment as manager or overseer on a plantation. Experience has been in Queensland and Fiji. Is good at figures and capable of taking charge of books if necessary.

No. 123.—Married man, 35 years of age, with 5 years' experience on poultry and stock farm in California, wishes to get on to a farm in Natal. His wife is a good cook and handy in dairy. Would be willing to work for a very small wage or for their keep or a period of twelve months at least, after which they would expect some remuneration. Can produce first class personal references.

No. 124.—Practical man, age 35, unmarried, seeks position on any work. Can undertake or attend to any building work and erection of machinery, and has been accustomed to control of coloured labour. Could undertake management of small creamery. Not afraid of work. Has had considerable experience in Agriculture, and can produce highest references.

No. 125.—Single man, age 31 years. Was brought up on a farm in England. Is a tinsmith and plumber by trade, also has a good knowledge of carpentry. Speaks Dutch. Has been in South Africa for ten years.

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127.—An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement up to February, 1910. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 128.—Wishes to secure employment on a farm. States that he has a general knowledge of engineering, and has been employed on a large and well-known farm in the Richmond Division.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

FEES FOR AGRICULTURAL ANALYSIS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

POULTRY.

Orders will be received for eggs for sitting of the following breeds for immediate delivery:—Buff Orpingtons, White Leghorns, Silver Wyandottes and Plymouth Rocks,

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible:—

Admittance of Students to the School of Agriculture.—House Master, Cedara.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.

Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.

Agricultural Seeds, etc., for Irrigation Farming.—Curator, Government Station, Weenen.

Fruit.—Orchardist, Cedara.

Accounting Business.—Accounting Clerk, Cedara.

Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.

Apiculture — 'vianist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry,
Cedara.

Why farming will now pay: because the world's markets are open to you! Place your maize products with the Railway Department and they will dispose of them on your behalf on the European markets! You produce—the Railways will sell! *Result*: A minimum of trouble to you and a maximum of money in return!—*South African Maize Brochure*.

Executives of Farmers' Associations.

The Editor will be obliged if the Secretaries of Farmers' Associations and similar institutions will kindly keep him advised with regard to changes in the personnel of their Executives.

ALEXANDRA AGRICULTURAL AND HORTICULTURAL ASSOCIATION.—President: Wm Thompson. Hon Vice-Presidents: A Blamey, E W Hawksworth, Thos Kirkman, H Basley, J L Knight, R.M. Hon Secretary and Treasurer: Geo Lamb. Hon. Auditor: W B Brunner. Committee: W Arnott, H G Arbuthnot, R C Archibald, R G Archibald, J Bazley, A Behrmann, W Cooke, G J Crookes, R Cruickshank, H D Hawksworth, H E Hawksworth, A F W Hawksworth, R C Hawksworth, J Landers, D McAndrew, F Nelson, C A Preston, Dr. Rouillard, W A Gilbert, Fred Blamey, Rev B M Ford, S C Hawksworth, J C Landers, S F Crookes, J J Crookes, R A Lindsay, J A Curle, F B Preston, R Parkin, H Reynolds, J B Stewart, C Taylor, H H P Waller, J Ross, Rev W C Wilcox, Dr W P Tritton.

ALFRED COUNTY FARMERS' ASSOCIATION.—President: A G Prentice, J.P. Vice-Presidents: C Knox, J.P., L T Trenor, and C A Holwell. Hon. Secretary and Treasurer: H C Hitchins. Committee: C M Etheridge, R Fann, J.P., V Hitchins, S Aitchison, J.P., W B Rethman, Dr Case, J.P., H Rethman, R G Mack, J Hogg.

BOSTON FARMERS' ASSOCIATION.—President: Thos. Fleming, J.P. Vice-President: T. W. Rudland. Hon. Secretary: W. J. Fly, J.P. Hon. Treasurer: H. A. Phipson.

CAMPERDOWN AGRICULTURAL SOCIETY.—President: John Moon, J.P. Vice-Presidents: J Gavin and John W Harvey, J.P. Hon Secretary: W E Allsopp.

CAMPERDOWN DIVISION FARMERS' ASSOCIATION.—President: C J A Scheepers. Vice-President: F N Meyers. Hon Secretary and Treasurer: J Baker. Committee: J Gavin, J W Harvey, J.P., C Baker, J Moon, J.P., H A Meyers, J F Scheepers, J Galtrey, B B Buchanan. Secretary and Treasurer: Jas Baker, P.O., Umhass Road.

CHARLESTOWN FARMERS' ASSOCIATION.—President: Johannes Vos. Vice-President: — Adendorff. Secretary: W. J. Curnow. Treasurer: J. O. Thomas. Committee: H. O. Eksteen, J. P. Vos, J. C. Uys, W. G. Thomas, D. Doyer, F. A. R. Johnstone, M.L.A., G. E. Lane, S. R. Higgins, B. F. Johnstone, A. J. Johnstone, J. J. Eksteen, R. H. Greaves, Peter Thompson, G. McArthur, and V. B. van Rooyen.

DRONK VLEI FARMERS' ASSOCIATION.—President: Capt A W B Percival. Vice-President: J H Dalgarno. Hon Secretary and Treasurer: A Hodson Creighton.

DUNDEE AGRICULTURAL SOCIETY.—President: T. P. Smith. Vice-Presidents: The Minister of Agriculture, the Mayor of Dundee, Messrs F Turton, H. Ryley, and A W Smallic. Hon Secretary and Treasurer: J McKenzie. Committee: G M De Waal, B J Humann, R Doidge, H P Walker, T J Williams, W Springorum, H W Walwyn, W J H Muller, D M Meumann, H J Head, C T Vermaak, A L Jansen, J Campbell, H Greenhough, D W H Tandy, A E Norman.

DURBAN AND COAST SOCIETY OF AGRICULTURE AND INDUSTRY.—President: E. W. Evans. Vice-Presidents: Sir B. W. Greenacre, A. M. Campbell, Hon. Marshall Campbell, M.L.C., W. Adams, Frank Stevens, C.M.G., M. S. Evans, M.L.A., P. D. Simmons, W. R. Poynton, Hon. C. G. Smith, M.L.C., G. S. Armstrong, M.L.A., H. R. Bousfield, W. G. Brown, C. Henwood, J. Livingston, John Nicol, C.M.G., H. H. Puntan, R. H. Wisely, V. Seymour, H. Sparks. Secretary: John Morley. Committee: J. Ellis Brown, J. Burman, C. A. L. Bull, D. Doyle, Samuel Deane, James Henderson, W. Konigkramer, W. D. Kimber, W. J. Mirrlees, W. Milne, J. Swales, W. J. Thompson, C. Wilson, Wilfred Payne, Wallis Short, S. T. Amos, J. McBride, F. M. Hillier, W. A. Stocken, and W. A. Bath. Treasurer: Edwin Greenacre. Auditor: W. Murray Smith.

DURBAN COUNTY FARMERS' ASSOCIATION.—Patron: J H Colenbrander. President: J McIntosh. Vice-Presidents: H Westermeyer, R R McDonald. Committee: F R W Behmer, G Compton, H Freese, W Freese, W Gillitt, H W Koenigkramer, H W Nichols, F Schaefermann. Hon Secretary and Treasurer: Frank J Volek.

EMPANGENI AND DISTRICT SUGAR PLANTERS' AND FARMERS' ASSOCIATION.—President: Col. G. B. Addison. Vice-President: P. Stott. Secretary and Treasurer: F. Piccione, P.O. Empangeni, Executive: P. Addison, G. Higgs, — Salvesson, — Blake.

ESHOWE DISTRICT FARMERS' ASSOCIATION.—President: J R Pennefather. Vice-President: C F Adams. Secretary: T Parkins. Treasurer: W T Brockwell.

GOURTON FARMERS' ASSOCIATION.—Chairman: M Sandison. Vice-Chairman: R Gray. Hon Secretary and Treasurer: Frederick B Burnard, Highfield P.O. Committee: Dr Landon, J.P., E Reed, J Woods, C van der Merwe.

HATTING SPRUIT FARMERS' ASSOCIATION.—President: A W Smallie. Vice-President: Thos Brookes. Hon Secretary and Treasurer: R J Hearn. Committee: G Queddon, N Glutz, Wm Craig, W R Qusted, W T Heslop, Thos Dewar, A E Norman, D P Campbell, J J Grove, H J Hearn, D W H Tandy, J B Pendar, J Campbell, J Barbour.

HIMEVILLE AGRICULTURAL SOCIETY.—President: Henry C Gold, Dartford, Underberg. Vice-Presidents: F E Peto, G H Royston, J B Nicholson. Hon Secretary and Treasurer: G Palframan, Watermead, Underberg. Executive Committee: G Malcolm, W S Johnston, P McKenzie, F E Peto, J S Gordon. Yard Steward: D T Malcolm. Auditors: T C Dearlove and F E Peto.

HOWICK FARMERS' ASSOCIATION.—Chairman: Thos Morton. Vice-Chairman: M A Sutton. Hon Secretary and Treasurer: A Clark.

INGOGO FARMERS' ASSOCIATION.—President: E. W. Noyce. Vice-Presidents: G. A. Finstone and D. A. Drummoad. Hon Secretary and Treasurer: C. Drummond. Committee: W C F Napier, A Paine, A J Garriock, A Wood, J.P., J H Green-Thompson, G H Bishop.

Ixopo Agricultural Society.—President: F L Thring, J.P. Vice-Presidents: Col W Arnott, B.M.R., W K Anderson, J.P., C E Hancock, J.P. Committee: John Anderson, Thos Allen, J C Auld, H D Archibald, F S Beningfield, S Boyd, T L Clarence, F E Foxon, R.M., Wm Foster, Jas T Foster, C C Foster, Geo E Francis, L Gray, A M Greer, J.P., J R Greer, Wm Gold, H A Hill, C F Harris, A E Keith, R Kennedy, Geo Martin, W Oakes, L J Phipps, T F Remfry, J W Robinson, Jas Schofield, M.L.A., D C Small, A Stone, W R Way, A H Walker, M.L.A., P D Webb. Hon Secretary: G C Way, Hon Assistant Secretary: A G Harris. Hon Treasurer: T Arnott.

Ixopo Farmers' Association.—President: C. E. Hancock, J.P. Vice-Presidents: T. F. Remfry and R. Vause. Hon. Secretary and Treasurer: Geo. E. Francis, Morningview, Ixopo. Delegates to Farmers' Union: Col. Arnott and T. F. Remfry, with W. D. Campbell as reserve. Committee: John Anderson, W. Oakes, D. Campbell, G. C. Way, James Foster, A. Keith, G. Martin, F. Z. Thring, A. C. Kirkman.

Klip River Agricultural Society.—President: Daniel Bester. Vice-Presidents: Herman Illing, J G Bester, Wm A Illing. Secretary and Treasurer: Edward V Bambrick (Box 98, Ladysmith). Executive Committee: A Brink, J Farquhar, C.M.G., M.L.A., W C Hattingh, J G Hyde, Trev Hyde, A I Horsley, W Freer, L A Leonard, H Nicholson, H C Thornhill, Herman Illing, D Munger, P de Waal, J H Newton, D Sparks, J.F., J T Francis, A W (Gus) Illing, G Pinkney, W Cochrane, George L Coventry, and *ex officio* officers.

Krantzkop Farmers' Association.—President: Capt M Landsberg. Vice President: P R Vermaak. Hon Secretary and Treasurer: G T van Rooyen. Committee: C J van Rooyen (Albany), C J van Rooyen (Wonderfontein), J. A. G. Mare, L M van Rooyen, Jnr, R P Martens, J P Nel, Dr Proksch, and F E van Rooyen.

Lion's River Division Agricultural Society.—President: Graham Hutchinson. Vice-President: H Nisbet. Executive Committee: H Nisbet, M A Sutton, A J Holmes, J Humphries, Jno Pole, and W A Lawton. Auditor: W J R Harvard. Hon Secretary and Treasurer: Arthur F Dicks, P.O. Box 1, Howick.

Little Tugela Farmers' Association.—President: F van de Waal. Vice-President: F G King. Secretary and Treasurer: H L Frances. Auditor: A D Buchanan. Committee: P R Summersgill, F W Holmes, J P Wepenaar, J J Harding, Max Cameron.

Loteni Farmers' Association.—President: J A Tod. Vice-President: T Carter. Hon Secretary: A Kennedy Stone.

Lower Tugela Division Association.—President: W R Hindson. Vice-President: A E Foss. Hon Secretary and Treasurer: H Curtis Smith (Stanger). Committee: A S L Hulett, F Addison, G Stewart, T G Colenbrander.

LOWER UMZIMKULU AGRICULTURAL ASSOCIATION.—President: D C Aiken, J.P. Vice-Presidents: H Albers and C H Mitchell, J.P. Hon Secretary and Treasurer: W J Plows. Committee: C Manning, J W Aiken, W G Camp, T F Godwin, J Hutton, H Norden and A Borchard. Hon Secretary, Show Committee: J W Aiken. Show Committee: A E Collison, A Borchard, F Knoop, A Ringo, H F Voigts, J Hutton, C Manning, A J Lugg and H Albers. Hon Auditor: J W Aiken.

MID-ILLOVO FARMERS' CLUB.—Chairman: H S Power, J.P. Vice-Chairman: B B Evans. Hon Secretary: J W V Montgomery. Assistant Hon Secretary: A L Wingfield. Hon Treasurer: Jos McCullough.

MOOI RIVER FARMERS' ASSOCIATION.—President: R Garland. Vice-President: C B Lloyd. Hon Treasurer: H A Rohde. Collector: Capt W H Stevenson. Auditor: Claude Scott. Hon Secretary: H B Hall.

MUDEN AGRICULTURAL ASSOCIATION.—President: Thos Thresh. Vice-Presidents: Wm Lilje, E A Grantham. Secretary and Treasurer, C A Selling. Committee: Otto Rottcher, Karl Lilje, Karl Rotter, Herman Schafer, Fritz Torlage, T Braithwaite, Ernest Rottcher, C H Tilbrook, Rev H Rottcher (Hon Life Member).

NEWCASTLE.—President: F A R Johnstone, J.P. Vice-President: C Earl, J.P., Mayor of Newcastle; Angus Wood, J.P., Ingogo; O Schwikkard, C.M.G., Newcastle. Secretary: Wm Beardall. Treasurer: Ed Nicols. Executive Committee: L H S Jones, E Phillips, H C Caldecott, C Watson, G Langley, W A Lang, W J P Adendorff, J E de Wet, O Davis, S W Reynolds, B Pettigrew, G W Thomas, G H Bishop, H R Muir, M C Adendorff, W Napier, P Van Breda, Chriss Botha, G Templar.

NEW HANOVER AGRICULTURAL ASSOCIATION.—President: G C Mackenzie. Vice-Presidents: J C Watt, J.P., and R H Oellermann. Life Member: C A S Yonge, M.L.A. Secretary and Treasurer: W D Stewart, New Hanover. Auditor: J H F Hohls. Committee: W N Angus, E Bentley, W W Bentley, Edward Boast, E E Comins, G R Comins, C Crookes, jun, H Dinkelmann, J Duval, W Fortmann, Dr C H Herbert, J Hillermann, J H F Hohls, H Jacobson, H A Iight, G C Mackenzie, A F Mackenzie, T M Mackenzie, J Muirhead, J.P., Oswald Muirhead, G Moe, J.P., J Moe, O Moe, C Oellermann, F Oellermann, C J Oellermann, W Ortmann, J C Otto, E Peckham, J.P., J A Potterill, S Peckham, C M Scott, Rev J Scott, Wm Schroeder, J.P., Owen Solomon, J H Smith, Riby Smith, F Thole, H Vorwerk, H F Westbrook, W H Westbrook, C Westbrook, T Wolluter.

NOODSBERG ROAD AGRICULTURAL ASSOCIATION.—President: Fritz Reiche, J.P. Vice-Presidents: H Mummbrauer, P Rodchorst, W Dralle, W Wortmann. Committee: W Bartels, F Bosse, H Brammer, A J Bruyns, H Bruyns, Carl Dralle, H Gebers, W Gevers, J H Holley, jun, W C Holley, C Hillermann, L Koch, H Kohler, F E Kuhn, M Maister, H Mereis, A Meyer, H Meyer-Estorf, H W Meyer, K A Meyer, H Misselhorn, W Misselhorn, K Peters, I Pfothenauer, G Rabe, G Reiche, Joh Reiche, W Renken, H Rosenbrock, H Schmidt, K Schmidt, Rev Jas Scott, K Seele, F J Smith, J Thies, W Witthoft, P Worthmann, A Worthmann, F Worthmann, H Worthmann. Secretary: Paul Vietzen, P.O., Singletree. Hon Treasurer: E Beurlen.

NOTTINGHAM ROAD FARMERS' ASSOCIATION.—President: B. Greene Vice-President: Geo Ross. Secretary and Treasurer: H Singleton, Nottingham Road. Committee: J King, J C Parker, J J Morton, A Pearce, W Wood, C J King, A Mengens, K Soutar, W F Taylor, W A Dales.

PIETERMARITZBURGSCH BOEREN VEREENIGING.—President: D P Boshoff. Secretary: E G Jansen, 313, Loop Street, Maritzburg.

POLELA AGRICULTURAL AND HORTICULTURAL SOCIETY.—President: J Isbister. Vice-Presidents: W H Allwright, J F Alexander, and H Brown. Hon Secretary and Treasurer: J Anderson Speak. Auditor: A Brown. Executive Committee: J Isbister, W H Allwright, J F Alexander, H Brown, H J Gazzard, G W Foster, J Anderson Speak. Hall Committee: W H Allwright, F Crossley, A Brown, with the trustees—J F Alexander, H E Mingey, and Geo Forder.

QUDENT FARMERS' ASSOCIATION.—President: P E Tittlestad. Vice-President: W Calverley. Hon Secretary and Treasurer: E Tittlestad. Committee: H A Koch, S N Robbins, G M Anderson, B B Bunting, E Tittlestad.

RICHMOND AGRICULTURAL SOCIETY.—President: John Marwick. Vice-Presidents: W P Payn, J W T Marwick, C O and J W McKenzie and Chas Nicholson. Hon Treasurer: R Nicholson. Hon Secretary: Cecil Williams. Committee: Evan Harries, R A McKenzie, H M Moyes, Thos Marwick, J C Nicholson, J W Flett, A W Cooper, J.P., J W Hammond, C E Simes, Tom McCrystal, and the seven office-bearers (*ex-officio*).

RICHMOND ROAD FARMERS' ASSOCIATION.—President: Thos Stead, J.P. Vice-President: W Mapstone. Secretary and Treasurer: W L Stead, New Leeds. P.O. Committee: D Malcolm, J Mapstone, W P Payne, J James, J Sinclair, W S Crouch, H B Boyd, W Middleton, W Oldfield, T E Horwood.

ROYAL AGRICULTURAL SOCIETY OF NATAL.—President: Sir G M Sutton, K.C.M.G. Vice-Presidents: W S Crart, Jas King, D C Dick, G J Macfarlane, C.M.G., O Hosking, with His Worship the Mayor, *ex officio*. Secretaries, Treasurers and Collectors: Duff, Eadie & Co, 12, Timber Street, Pietermaritzburg. Yard Superintendent: H J Stirton. General Committee: T J Allison, W H Buchanan, F G Burchell, W H Cobley, P H Campbell, R Comins, W P Gough, E S Goodwill, K H Hathorn, K.C., T W J Hall, J Hall, L Line, Col Sir D Mackenzie, K.C.M.G., Jas Morton, Sir T K Murray, Jno Moon, W J O'Brien, P Otto, R H Pepworth, J F Potterill, A Robinson, Rev J Scott, P D Simmons, H Solomon, W L Stead, H J Stirton, Dr Oddin Taylor, F W Jameson S J Mason. Executive Committee: President, Vice-Presidents, and W J O'Brien, W H Cobley, K H Hathorn, K.C., and Col E M Greene. Members appointed by Corporation: Councillors Ireland, Sanders and Hathorn.

SLANG RIVER (UTRECHT) FARMERS' ASSOCIATION.—Chairman: P J Kemp. Executive Committee: J J Uys, J Z Moolman, T J Botha, P J Viljoen, P J Kemp. Hon Secretary and Treasurer, Thys Uys, Utrecht P.O.

UMSINGA-BIGGARSBERG FARMERS' ASSOCIATION.—President: E C Nuss. Vice-President and Acting Secretary: Geo S Saunders, Helpmakaar.

UMVOTI AGRICULTURAL SOCIETY.—President: Major T Menne. Vice-Presidents: Theunis J Nel, M.L.A., W J Slatter, W L'Estrange. Executive Committee: Tol Nel, A Newmarch, W Lilje, O Rottcher, S C Van Rooyen, W Newmarch, E J Van Rooyen, O Norton, I M Nel, J Browning. Managers of Show Yard: J M Handley and N Hunter. Hon Auditor: W K Ente. Secretary and Treasurer: W H Gibbs.

UMVOTI FARMERS' ASSOCIATION.—President: P R Botha (J's son). Vice-President: J M Handley. Secretary and Treasurer: G E Cadle (Box 6, Greytown). Auditor: J M Nel. Committee: W J Slatter, J G Nel, H F Torlage, R J Landsberg, A Newmarch, P H van Roozen, A F Handley.

UPPER BIGGARSBERG FARMERS' ASSOCIATION.—President: W L Oldacre. Vice-President: G Langley. Hon Secretary: W F B Sutherland.

UTRECHT AGRICULTURAL SOCIETY.—Chairman: L Viljoen. Vice-Chairman: B H Breytenbach. Members: I Bierman, M M Knight, J H Klopper, B C Hattingh, T Botha, M Gregory. P L Uys, H P Breytenbach. Secretary: G J Shawe.

UTRECHT BOEREN VEREENIGING.—President: D J A van der Spuy. Secretary: G J Shawe, Utrecht.

VICTORIA COUNTY AGRICULTURAL SOCIETY.—President: Lieut-Col F Addison. Vice-Presidents: Sir Liege Hulett, Kt, M.L.A., W J Thompson, Esq, J.P., J Polkinghorne, Esq, M.L.A. Committee: Messrs W H B Addison, G S Armstrong, M.L.A., C Bishop, J.P., D Brown, sen, J.P., W Campbell, T C Colenbrander, A E Foss, J.P., A S L Hulett, J.P., J B Hulett, C Jackson, G Nicholson, J.P., T Polkinghorne, J W Perkins, J.P., E Saunders, J.P., G Stewart, and J H Stansell. Hon Secretary and Treasurer: H Curtis Smith (Stanger).

VRYHEID (WARD I.) AGRICULTURAL SOCIETY.—President: E Dalton. Vice-President: J F Potgieter. Secretary: F Kolbe. Assistant Secretary: H Lombaard. Committee: Secretary, Assistant Secretary, and A von Levetzow, T Ries, P Grobler, F Molman, A Steenkamp.

WEENEN AGRICULTURAL SOCIETY.—President: Allan Stuart. Vice-Presidents: R Garland, R H Ralfe, F I de Waal. Hon Treasurer: F C Schiever. Hon Secretary: E Cautherley. Auditor: S Wolff. Executive Committee: Hon H D Winter, M.L.A., J W Moor, M.L.A., D W Mackay, T H Hindle and L L'Estrange. Manager of Show Yard: S Vaughan. Assistant: A Clouston.

WEENEN COUNTY HORTICULTURAL SOCIETY. Committee of Management: The President and Treasurer of the Weenen Agricultural Society and C J Offord, G W Linfoot, T J Nunn, Dr Brewitt, S Vaughan. Hon Secretary: F Cautherley.

ZULULAND FARMERS' ASSOCIATION.—President: F W White. Vice-President: C E Symonds. Secretary: R H McAlister. Committee: Hon D C Uijs, A W Symonds, H T James, R J Ortlepp, J N R Dixon.

ZULULAND COAST FARMERS' ASSOCIATION.—President: G H Hulett. Vice-President: C Hill. Hon Secretary and Treasurer: F Brammage, Ginginhlovu.

East Coast Fever Advisory Committees.

(NOTE.—Owing to sparse European population, the following Magisterial Divisions have no Advisory Boards: Ubombo, Mapumulo, Ingwavuma, Mahlabatini, Ndwandwe, Nkandhla and Hlabisa.)

ALEXANDRA.—Chairman: W Thompson, Umzinto. Members: H Bazley, R C Archibald, A Blamey, H Reynolds, G J Crookes, R Parkin, J A Curle.

ALFRED.—Chairman: Magistrate. Members: A G Prentice, Rev. S Aitcheson, J E Brown, F H Boddy, H M Raw, H Rethman, H C Hitchens, H J R Hatchwell, W P Bouserie.

BERGVILLE.—Chairman: T E Zunekel, J.P., Bergville. Members: P H Van der Riet, J G Fannin, H Jackson, C Halferty, F Zunekel, Mbulali—Consulting member for natives.

BULWER.—Chairman: Magistrate. Members: R Comrie, Wm Colville, R Gordon, H Cole, P Garson, P McKenzie, G Malcolm, H C Gold, R Justice, E Stafford, W Little.

CAMPERDOWN.—Chairman: A N Kirkman, Cato Ridge. Members: J F Erfmann, P J Kingham, W B Turner, C J A Scheepers, W Mercer, L G Wingfield Stratford, J W Harvey, B B Evans, J W V Montgomery, B R Buchanan, W L Stead. **SUB-DIVISIONAL BOARDS.**—No. 1. *East of Railway Line from "Spitzkop" to Railway Line.*—Chairman: J F Erfmann, Cato Ridge. Members: P J Kingham, H Dinklemann, F L Meyer, J H Meyer, H A Meyer. No. 2. *East of Railway Line from West of Government Fence.*—Chairman: C J A Scheepers, Thorneysbush. Members: W B Turner, W Mills, J F Scheepers, H Nadauld, G S Phipson. No. 3. *West of Railway Line from Koning Krantz to Killairney and along Umlaas River.*—Chairman: A N Kirkman, Clairmont. Members: W Mercer, W Brown, R Godfrey, W S Meyer, E W Meyer. No. 4. *West of Railway Line, rest of Division between Main Line, Umlaas River Boundary of No 3.*—Chairman: N L Stead, Thornville Junction. Members: F H Meyer, J R Schwegmann, W E Schwegmann, W S Crouch, B R Buchanan (Hon. Sec., Manderston). No. 5. *West of Main Line, Beaumont, East of Mair Mid-Illovo River from Westley's Drift to Umgwaranta River.*—Chairman: J W Harvey, Camperdown. Members: L G Wingfield Stratford, R Lyne, J A Hutton, E H Hayes, F E Groom. No. 6. *Mid-Illovo West of Line, rest of Division South of Umlaas River.*—Chairman: B E Evans. Members: J W V Montgomery, J H McCullough, J Ballam, J James, H S Power.

DUNDEE.—Chairman: F Turton, Glencoe Junction. Members: J Campbell, J J Grove, H Wiltshire, G M De Waal, Aug Jansen, A J Potgieter, A Cronje, A Schuid, H Greenbough. **SUB-DIVISIONAL BOARDS.**—*Glencoe Sub-area.*—Members: F Turton, H Greenbough, W H Miller, F Schroeder, V Marshall, J Lausen, J J De Jager, Rev Father Rauch (Native interests). *Hatting Spruit Sub-area.*—Members: J J Grove, H A J Davil, A E Norman, J Campbell, Rev J Dewar (Native interests). *East of Helpmakaar Road.*—Members: A M Cronji, D C Pieters, P Meyer, J A Naude, A Jansen. *West of Helpmakaar Road.*—Members: A J G Meyer, A P Lund, D C Uys, A J Van Tonder, Jun, A J Potgieter. Members of Joint Committee for Area West of Helpmakaar: A J Potgieter, A P Lund. Members of Joint Committee for Area East of Helpmakaar: A Jansen, A M Cronji. *Area between Main Fryheid Railway Lines.*—Members, W Craig, H Wiltshire, C M Meyer, Sen, A Spies, Jun, C M De Waal.

DURBAN BOROUGH.—Chairman: E L Acutt, Durban. Members: H R Bousfield, R Benningfield, G Swales, J Haynes, — Arthur.

EMTONJANENI.—Chairman: Magistrate. Members: F W Smith, H J James, F W White, A W Symmonds, R J Ortlepp, D C Uys, L J Van Rooyen.

ESHOWE.—Chairman: A Boast, Magistrate. Members: A Moore, G H Hulett, C F Adams, T Parkins, A T Wantink, F J Dickens, H H Thole.

ESTCOURT.—Ward 2. *East of Main Line.*—Chairman: A Stuart. Members: Magistrate, J Ralfe, J W Haw, J G Hatting, A Peniston, A B Haviland, G M Rudolph. Ward No. 3. (Boundaries): The Bergville Magisterial Division, Tugela

to junction of the two Tugelas; The Winterton Settlement fence to Vaai Plaats fence and Ovington and Sibhamie's Location fence, and from there to Government Game Reserve).—Chairman: H J De Waal, Glenisla. Members: R Gray, M Sanderson, R J Land, A Spearman, H L Bacon. *Ward No. 4* (Estcourt West of Railway Line; follow Bushman's River as far as Mr. Kerr's farm, then Nalaara's Location fence as far as Game Reserve).—Chairman: R H Ralfe. Members: F C Schiever, J Rencken, W Couch, P Male, T L Fyvie, J Hatting, A W J Hatting. *Ward No. 5* (Boundaries: Remainder of District West of Line).—Chairman: H Blaker, Estcourt. Members: W Comins, E B Griffin, H A Woodruffe, Col. Crompton, J Russell, A C Robinson, Jun, A E Downing, A D Shaw, J W Bentley.

GREYTOWN.—Chairman: Paul Hansmeyer, Greytown. Members: D Havemann, A Newmarch, J A Nel, W T Slatter, A T Handley, H S Botha. *Central Board*.—Chairman: P Hansmeyer, Greytown. Members: J A Nel, A Newmarch, W J S Newmarch, T K Taylor, S W Cadle, R J Van Rooyen, E J Van Rooyen, J G Nel.

INANDA.—Chairman: C R Bishop, J.P., Umgeni. Members: R Harrison, W Sykes, Jun, E Dore, W Campbell, R Armstrong.

KLIP RIVER.—No. 1 (A line from Elands Laagte along the Matawaans and Jononos Kop to the Berg; North line, Dundee boundary: all West of Main Line).—Members: C Mitchell Innes, R M Gray, L Meyer, J C Henderson, C Allen. No. 2 (O.R.C. line and boundary No. 1). Members: D Bester, A J Marais, W Allison, J Bester, — Brink. No. 3 (From Klip River Bridge to Sand Spruit, and up Sand Spruit to its source in the Berg).—Members: H A Potgieter, A A Wetherell, B Nel, F Van Rooyen, H Portsmouth. No. 4 (Rest of Division South and East of Sand Spruit and West of Main Line).—Members: W Leathern, H Illing, J H Newton, E Robinson, G W Willis. No. 6 (Whole of Division East of Main Line).—Chairman: J G de Waal. Members: R A Smith, H Nicholson, P Cronje, J Farquhar.

KRANTZKOP.—Chairman: L L D Proksch, Krantzkop. Members: L M J Van Rooyen, L M J Van Rooyen, F E Van Rooyen, J H Van Rooyen, J P Zietsman, A Johnson.

IXOPO.—Chairman: Magistrate. Members: Thos Allen, Geo Martin, E Marriott, A Stone, G A Cooper, J.P., Wm Gray, D Campbell, F L Thring, J.P.

LION'S RIVER.—No. 1 (Southern portion of West of Main Line).—Chairman: U K McKenzie, Lidgetton. Members: R J Spiers, F North, A McLean, J Morphew. No. 2 (Northern portion West of Main Line).—Chairman: G Ross, Nottingham Road. Members: J Clouston, K Soutar, D Connel, D Smythe. No. 3 (Southern portion East of Main Line).—J W Dicks, "Rosebank," Howick. Members: W M Henderson, — Buchanan, Jos Raw, H J McKenzie. No. 4 (Northern portion East of Main Line).—Chairman: H Burgmann. Members: W Methley, G Hutchinson, J J Morton, B Taylor. (The whole of the members of the Sub-Divisional Boards constitute the Central Board with the Magistrate, Lion's River, as Chairman.)

IMPENDHLE.—Chairman: T Fleming, Boston. Members: J Martens, P J Lourens, T Carter, C W Brooke, J W McLean, H Boike, C C Lewis, W S Alborough, W Harrington, C W Roberts, D Tootell. *Sub-Committee appointed for Northern portion of Division* (added to Lion's River Division).—Chairman: P J Lourens, Insinga, via Nottingham Road. Members: H Boek, C N Brooke, T Carter, J Martens, J W McLean. *Sub-Committee for Southern portion of Impendhle*.—Chairman: T Fleming, Boston. Members: C C Lewis, W S Alborough, W Harrington, C W Roberts, D Tootell.

LOWER TUGELA.—Members: W H B Addison, A E Jackson, H E Essery, A S L Hulett, J Brown, W O Robbins.

LOWER UMZIMKULU.—Chairman: Col. J F Rethman, North Shepstone. Members: Col. J R Royston, D C Aitken, J.P., C H Mitchell, J.P., G P Beachcroft, Claude Manning, H Albers, N Harper, J S Clarke, A Borchard, T Stapleton, Col. Bru-de-Wold.

MOOI RIVER.—Chairman: W. G. Randles. Members: J. H. Wallace, H. F. Cadle, R. Garland, John Bartholomew, J. W. Johnstone, C. R. Skottowe, J. N. Boshoff, J. R. Lindsay.

MTUNZINI.—Chairman: Magistrate. Members: F Green, G M J Gielink, G Getkate, W Saville, A H Konigkramer.

NEWCASTLE.—No 1 (to be known as Charlestown-Ingogo District from main line of Railway where it strikes the Southern line of the farm Cloutant West, thence along Western boundary of said farm, thence along S. W. boundary of Tipperary West, thence Southern boundaries of Hamstead, Dumferline and Roodeport, thence along the Northern side of the Botha's Pass main road to where it joins the O.R.C. Boundary, thence along the boundary of the Colony, thence along the Charlestown Fence to where it joins the Railway line near Mount Prospect Gate, thence along the Railway line to Cloutant West).—Chairman: J Vos, Charlestown I.O. Members: W J Adendorff, A J Johnstone, A Paine, A H Trouw, Angus Wood. No. 2 (Newcastle district Southern boundary of No. 1 along Railway line from Cloutant West, including portion of Town Lands, Newcastle, which by agreement with Government is considered to be West of line, thence along Railway line where it strikes the Southern boundary of the farm Kopjeallen, thence along Southern boundaries of Kopjeallen, The Gardens, and Lincoln to the Ingagane River, thence up the Ingagane up to the farm Falixtowe, along Southern boundaries of Falixtown, B. Iwerton, Brooklyn, Stonehenge, Tathamscamp, Hanover, Ellensdale, Endsel, Bejuisel, Stelazies Kop, Mount Blanc, to O.R.C. border fence, thence along O.R.C. boundary joining Southern boundary of No. 1 at Botha's Pass).—Chairman: S W Reynolds. Members: F A R Johnstone, W Moller, J.P., L H S Jones, C Earl, F Meyer, J J Muller, — Van Breda, J Macdonald, J C Adendorff, E Sanders. No. 3. *Dannhauser District* (Bounded by Southern District No. 2 from the Railway line at Kopjeallen to the Berg, thence along O.R.C. border, the boundary between Newcastle and Klip River Divisions, thence along the Railway line to the farm Kopjeallen).—Chairman: W L Oldacre, Dannhauser. Members: Geo Friend, B Harrington, L J Muller, J Ecksteen, E Hodson, W Watson, Ted Twyman, G Langley, Don Urquhart. No. 4 (East of Railway Line, along the boundary between Newcastle and Dundee Divisions from the Railway Line near Dannhauser to the Buffalo River, along the Buffalo River to the junction of the Ingagane, thence along the Ingagane to its junction with the Ineander, thence along the Ineander to the fence of the Newcastle Town Lands, known as the Eastern boundary of the Railway Line, thence along the Eastern side of the Railway Line to the Magisterial Division boundary near Dannhauser).—Chairman: T K Boshoff, Dannhauser. Members: J H Potgieter, H Miller, J H van der Westerhuizen, J J Kemp, W Dicks, C Uys. No. 5 (the strip of land lying between the Railway Line and the Buffalo River from the Ingagane and Ineander streams, which form the North-Western boundary of No. 4 district).—Chairman: E W. Noyce, Boscobello P.O.; members, Geo Matthews, T K Panzera. *Central Board.*—Chairman: S W Reynolds, Newcastle. Members: F A R Johnstone, J Vos, Sen, Angus Wood, W Oldacre, W Watson, E W Noyce, F N Panzera, T R Boshoff, J H van der Westhuizen.

NEW HANOVER.—Central Board. Chairman: E Newmarch. Members: W W Bentley, T C Wolhuter, F Reiche, H Schmidt, E Lindhorst, W L'Estrange, A F McKenzie, W Meyer. *New Hanover Sub-Committee.*—Chairman: E Newmarch. Members: Jno Moe, W W Bentley, W Ortmann, T C Wolhuter, O J Muirhead. *Dalton Sub-Committee.*—Chairman: W L'Estrange. Members: A F McKenzie, R W Smith, G Reddinger, H Rosenbrock, J H Gordon, W Meyer. *Schroeders Sub-Committee.*—Chairman: F Reiche. Members: H Schmidt, E Lindhorst, G Moe, P Rodehorst, H T Rohrs, F Gorden, A Meyer, W Fortmann.

NQUTU.—Chairman: A Barklie, Utrecht. Members: H Wilkins, R L Flindt, W A Westbrook, J W F Hall, Dr. Knight.

PAULPIETERSBURG.—Chairman: N J Els, Viljoen's Rust. Members: J B Rudolph, G J Combrink, A Schutte, A Bester, P H van Rooyen.

PIETERMARITZBURG.—Chairman: B Swete Kelly, Pietermaritzburg. Members: W S Crart, C A Fawcett, W E Goodwin, E G McAlister, E E Hodgson.

RICHMOND.—Chairman: Magistrate. Members: E E Johnson, J Mapstone, G D Alexander, C P Lewis, C Nicholson, W Comrie, John Marwick, W P Payn, A H Cockburn. *Sub-Division No. 2.*—Chairman: G D Alexander, Nel's Rust. *Sub-Division No. 5.*—Chairman: W Oldfield, Fox Hill.

REIT VLEI DISTRICT.—Chairman: D. E. Muir, J.P., Elsmore, Mooi River. Members: P. Otto, J.P., R. J. Van Rooyen, E. J. Van Rooyen, J. G. Nel, A. Kohrs, J. Hooper, Otto Norton (Hon. Secretary).

SEVEN OAKS DISTRICT.—Chairman: W J S Newmarch, Harden Heights. Members: H M Balding, J.P., J Crow, J T Martens, H Mayne, S W Cadle.

UMGENI DIVISION.—Chairman: B. S. Goodwill. Members: F. Schreenn, B. Crompton, C. Arnold, R. J. Potts, A. J. Tyler, F. J. Smith, A. Wood, J. P. Symonds, J. J. Potterill, W. H. Keytel, C. Lund.

UMLAZI.—(Chairman: C Henwood, Durban. Members: W Pearcer, W Gillett, H Freese, L Jackson, P W Mackenzie.

UMSINGA.—No. 1 District (All farms lying West of the Umsinga-Helpmaakaar main road).—Chairman: E C Nuss. Members: W W Strydon, J.P., J H Nuss. No. 2 District.—(All farmers East of the Umsinga-Helpmaakaar main road—excepting the farms Sutherland, Gordon, Memorial Mission and Pomeroy Town Lands, and Location lying North of the Mazabeko and West of the Buffalo River.—Chairman: W H Wholberg, P.O. Elandskraal. Members: H W Dedekind, J Dedekind. No. 3 District.—(The remaining portion of the area lying in the Umsinga Division).—Chairman: A Muller. Members: M J Matheson, H Muller. The three Committees to constitute the joint Committee.

VRYHEID.—Chairman: A von Levetzow, Vryheid. Members: P Labuschagne, B E A Rabe, G M van der Westhuizen, J Kruger, J F Potgieter, L M N Nel.

WEENEN.—Chairman: C G Jackson, Weenen. Members: C Harding, J.P., P J van Rooyen, J.P., K Rotteher, S B Buys, J J Vermaak, L C Kinsman, J W A Pole, C F Vermaak, P R Buys, J C's son.

Publications Issued by the Department of Agriculture.

THE following publications, issued by the Department of Agriculture, are still in print, and copies may be obtained free (except those with price attached) upon application to the office of the *Agricultural Journal*, Department of Agriculture, Pietermaritzburg. The figures in square brackets (e.g. [1904]) are the years in which the various publications were issued.

No.

BULLETINS.

- 2.—“Manures on the Natal Market, 1902,” by Alex. Pardy, F.C.S., Analyst. [1902.]
- 4.—“Manures on the Natal Market, 1903,” by Alex. Pardy, F.C.S., Analyst. [1903.]
- 6.—“Manures on the Natal Market, 1904,” by Alex. Pardy, F.C.S., Analyst. [1904.]
- 7.—“Tree-planting in Natal,” by T. R. Sim, F.L.S., Conservator of Forests. [1905.]
(Price 2s. 6d., post free.)
- 8.—“Agricultural Co-operation,” by E. T. Mullens, Secretary, Minister of Agriculture. [1905.]
- 10.—“Manures on the Natal Market, 1905,” by Alex. Pardy, F.C.S., Analyst. [1905.]
- 11.—“East Coast Fever,” by S. B. Woollatt, Principal Veterinary Surgeon. [1906.]
- 12.—“Manures on the Natal Market, 1906,” by Alex. Pardy, F.C.S., Analyst. [1906.]
- 13.—“Report on the Disease known as ‘Bluetongue’ in Sheep,” by H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E., Govt. Bacteriologist and Director, Govt. Laboratory. [1908]
- 14.—“Poultry-Keeping in a Simplified Edition for Farmers,” by F.C. [1908.]
- 15.—“The Export of Citrus Fruit,” by Claude Fuller. [1909.]
- 16.—“Some Common Bagworms and Basketworms,” by Claude Fuller. [1909.]
- 17.—“Dipping and Tick-Destroying Agents,” by H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E., Govt. Bacteriologist and Director, Govt. Laboratory. [1909.]

REPORTS.

Annual Report of the Agricultural Department, 1902. (Includes Reports of the Director of Agriculture, Entomologist, Conservator of Forests, Dairy Expert, Editor *Agricultural Journal*, etc.) [1903.]

Report of the Secretary, Minister of Agriculture: January 1, 1903, to June 30, 1904. [1905.]

Report of the Secretary, Minister of Agriculture, for the year ended 30th June, 1905. [1905.]

Report of the Secretary, Minister of Agriculture, for the year ended 30th June, 1906. [1906.]

(For a continuation of the statistics given in these reports see reprint "Natal's Progress in 1906," noted below.)

Fourth Report of the Government Entomologist: 1903-4. [1905.]

Fifth Report of the Government Entomologist: 1904-5. [1906.]

Sixth Report of the Government Entomologist: 1905-6. [1907.]

(The Third Report of the Entomologist is included in the "Report of the Agricultural Department, 1902," noted above.)

Report of the Conservator of Forests, 1902. [1903.]

Interim Report of the Conservator of Forests up to December 31, 1905.

Report of the Principal Veterinary Surgeon, for year ended 30th June, 1906. [1907.]

First Annual Report of the Land Board, 1905. [1906.]

Annual Report of the Land Board, 1906-7.

MISCELLANEOUS REPRINTS, ETC.

Black Spot ("Letter Book Pages": reprinted from *Journal*.)

Mealie Grubs (do do)

Mosquitoes (do do)

Woolly Aphis (do do)

Cotton. By A. N. Pearson, Director, A. E. & C. (Reprinted from *Journal*: 1904.)

Co-operation. By E. T. Mullens, Secretary, Minister of Agriculture. (Reprinted from *Journal*: 1907.)

Citrus Fruit Export. (Reprinted from *Journal*: 1907.)

Natal's Progress in 1906. (Reprinted from *Journal*: 1907.) The statistics contained in this paper are on the same lines as those in the Annual Reports for previous years of the Secretary, Minister of Agriculture.

Natal's Progress in 1907. By H. J. Choles, F.S.S. (Reprinted from *Journal*: 1908.)

Fibre Cultivation. (Reprinted from *Journal*: 1907.) This paper is a summary of Bulletin No. 13 of the Department of the Interior, Bureau of Agriculture, Manila.

Sisal, Mauritius Hemp and other "Aloe" Fibres. By T. R. Sim, F.L.S., Conservator of Forests. (Reprinted from *Journal*: 1907.)

The Fibre Industry of Mauritius. By Leonard Acutt, J.P., Tongaat; Member of the Land Board, Natal. (Reprinted from *Journal*: 1907.)

South African Products Exhibition, 1907. Report of T. R. Sim on the Natal Exhibits. (Reprinted from *Journal*: 1907.)

Poplar Timber for the Local Manufacture of Matches. By E. R. Sawyer, Director, E.S. (Reprinted from *Journal*: 1908.)

Agricultural Industries and Land Settlement in Natal. [1907.]

Judging Fruit, Flowers, Plants and Vegetables at Shows. By T. R. Sim, F.L.S., Conservator of Forests. [1906.]

Agricultural Statistics, Natal, 1905-6. [1907.]

Model Rules for Agricultural Co-operative Societies. (Price 1s., post free.)

Government Laboratory.

SCALE OF CHARGES FOR ANALYSES, VACCINES, ETC.

The following is the scale of charges fixed for analyses, etc., at the Government Laboratory, Allerton, Pietermaritzburg :—

				£	s.	d.
Drinking-water Analysis :						
Chemical ... ..	...	...	...	2	2	0
Bacteriological ... ..	...	...	...	5	5	0
Milk, Analysis ... ..	...	...	...	0	10	6
Sputum, Bacterioscopic examination ... ..	...	...	...	0	5	0
Biological test for Tubercle ... ..	...	...	...	1	1	0
Throat-swabs for Diphtheria (prepared swabs obtainable on application) :						
Bacteriological Report ... ..	...	...	...	0	2	6
Urine, ordinary clinical examination ... ..	...	...	...	0	5	0
Quantitative estimation of glucose ... ..	...	...	...	0	10	6
Biological test for Tubercle ... ..	...	...	...	1	1	0
Fæces, for Ankylostomiasis ... ..	...	...	...	0	2	6
Blood (collecting outfit obtainable on application) agglutination test for Typhoid (Widal), Paratyphoid, Malta Fever, etc.				0	5	0
Tumours and Morbid Tissue :						
Microscopic examination ... ..	...	...	10s. 6d. to	2	2	0
Post Mortem examinations ... ..	...	...	10s. 6d. to	5	5	0
Toxicological examinations ... ..	...	...	10s. 6d. to	21	0	0
X-ray examinations, blood-counts, etc., by special arrangement.						

The following sera, vaccines, etc., are issued at the prices indicated :—

				s.	d.
Anthrax Inoculation, per double dose of two inoculations ... ..	...	...	...	0	6
Anti-Diphtheritic Serum, per dose ... ..	...	...	...	5	0
Anti-Streptococcic Serum, per dose ... ..	...	...	...	2	0
Anti-Tetanic Serum, per dose ... ..	...	...	...	2	0
Mallein, per dose... ..	...	...	...	0	4
Tuberculin, per dose ... ..	...	...	...	0	4
Anti-Venene (for snake bites), per dose ... ..	...	...	...	5	0
Blue Tongue Vaccine, per 25 doses ... ..	...	...	...	2	0
Blue-Tongue Curative Serum, per 50 cub. c. ... ..	...	...	...	2	6
Quarter Evil Vaccine (in five and ten dose packets), per dose ... ..	...	...	...	0	3
Q. E. V., Double Inoculation, per dose ... ..	...	...	...	0	6

Appliances for inoculations, syringes, etc., are also supplied from the Laboratory.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
Commissioner of Mines,

NATAL GOVERNMENT RAILWAYS.

RATES FOR SOUTH AFRICAN WATTLE BARK.

WITH effect from 1st January, 1910, the rate for the conveyance of South African Wattle Bark *in bundles* between N.G.R. Stations will be the No. 6 S.A.P. "C" rate *plus* 10 per cent., subject to a minimum charge of 2d. per 2,000 lb. per mile.

General Manager's Office,
Maritzburg, 16th September, 1909.

EDWARD R. ROSS,
General Manager.

SOUTH AFRICAN STUD BOOK.

A record of all classes of Stock; the object being to encourage the breeding of thoroughbred stock and to maintain the purity of breeds, thus enhancing their value to the individual owner, and to the country generally.

Application for Membership and Entries of Stock should be addressed:—

FOR CAPE COLONY	A. A. PERSSE, P.O. Box 703, Cape Town.
„ TRANSVAAL	F. T. NICHOLSON, P.O. Box 134, Pretoria.
„ ORANGE RIVER COLONY ..	E. J. MACMILLAN, Government Buildings, Bloemfontein.

THE SOUTH AFRICAN STUD BOOK

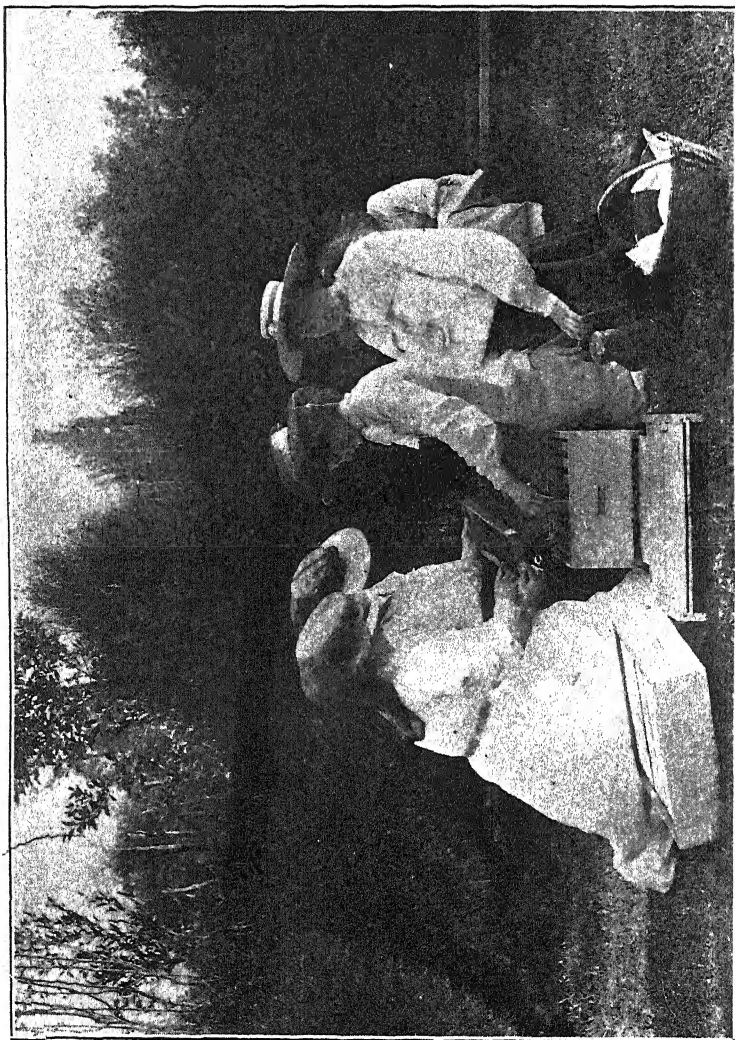
IS OBTAINABLE OF:—

T. MASKEW MILLER,

ADDERLEY STREET, CAPETOWN.

PRICE 10s. 6d.

A. A. PERSSE,
SECRETARY, SOUTH AFRICAN STUD BOOK ASSOCIATION,



BABY BEES.

(See article by Miss Ritchie in this month's issue)

The Natal Agricultural Journal.

Maize Prospects.

WE are now in the middle of the planting season for mealies. Last year planting commenced late, on the whole, the idea being to try and escape as far as possible the ravages of the mealie grub; this year planting is being done quite as late, partly for the same reason and partly on account of the unfavourable soil conditions which have prevailed owing to the unusual dryness of the weather. In regard to this latter point, matters have in some districts been somewhat serious, and even now it is doubtful whether in those districts the area that is being planted with mealies is even as large as that of last year. The spring opened with promise of a fair season all round. Owing to the late rains that were experienced in autumn the ground on the whole at the end of winter was not as hard as usual, and it was still further improved by good rains at the beginning of the spring. As we have said, the season promised to be a wet one, but the rains gradually diminished, and eventually a state of affairs that bore a strong family resemblance to drought made its appearance in many districts: some parts of the country, indeed, hardly saw a drop of rain for two months or more. This at ploughing time was not a state of things to sweeten farmers' tempers. Disc ploughing was tried, but the resulting clods were too large and too hard to be broken up without the expenditure of an undue amount of time and labour. In some parts of the Colony, however, rains have fallen—but only just in time, and not to as great an extent as the dry state of the ground warrants. How the season, from a fortnight to six weeks before planting time, compares this year with last is clearly shown in our usual rainfall diagram published in the **MARKETS AND CROPS** supplement this month.

Thus much for the hampering influence of the bad weather. Another

factor of which mention should be made in passing, is, of course, the influence of East Coast Fever upon ploughing and planting. Draught power this season is perhaps scarcer than it has been for many years past; in some cases farmers still have their cattle, untouched as yet by the disease; in other cases "salted" herds are in evidence—the owners of these herds are the luckiest farmers of all, and although the herds are naturally very small seeing that the mortality from East Coast Fever is something like 95 per cent., nevertheless they serve all the purposes of ploughing, harrowing, and, later, of planting and cultivating. Other farmers, again, have been able to secure mules and donkeys; whilst a proportion of the farmers again have benefited by the Government steam ploughs. Ploughing is thus being done somehow—certainly not to as great an extent as would have been the case had conditions been quite normal (and there is no doubt that in such case the area put under mealies this season would have been considerably higher than that of previous seasons), but at the same time the main object, namely, to get in an average crop, is, we think, being accomplished, taking the Colony as a whole.

What all this means is this: that the season—the mealie season proper—has opened relatively badly; ploughing operations have been hampered by the undue dryness of the weather and consequent hardness of the ground, and partly also by the comparative scarcity of draught power; and as a result (*a*) perhaps a slightly lesser area, but at any rate we hardly think a greater area, has been put under the crop this year as compared with last season, and (*b*) the ground in many cases has not been converted into as good a seed bed as could be desired. Mealies, however, are hardy plants, and doubtless the crop will not suffer very much from this cause.

Under such hampering conditions does the present mealie season commence. We refer to them as hampering conditions because they will probably result in the restriction of the total area under mealies to the limits of last year. If they do no worse than this we shall have little to grumble at (and we do not altogether think that the area will be very much lower than that of last season), but naturally we are desirous of seeing an annual extension, to a very appreciable degree, of the area under the staple crop of the Colony, and any hampering of that extension, any set of conditions which will restrict the increase of the area even for a single season, we are naturally inclined to view with impatience. There will probably be no *real* loss to the Colony this season, but, had conditions been more favourable, the *gain* to the Colony might have been relatively great. Our area under mealies must increase annually, given favourable conditions; we have an almost unlimited market oversea—unlimited, at any rate, so far as Natal is concerned—and the more grain we can ship oversea the more we shall add to the wealth of the Colony.

But these nowadays are commonplaces. Of greater import to the

farmer, perhaps, will be a few remarks on mealie growing generally and on the essentials for securing large crops.

In most farmers' minds, the outstanding essential is undoubtedly manure—bone dust, superphosphate and other grain-forming phosphatic manures. To many farmers, too, the word Manure comprises the sum-total of the requisites for large crops. Ploughing and preparing the ground, of course, they accomplish in some fashion, not with any view to increasing the yield of the crop but merely to provide a medium for the growth of the plants—a medium wherein the seed may germinate, and wherein, later, the roots of the plant may seek food and moisture. A cultivation or two cleans the weeds from between the rows: and, the fertiliser having already been applied at the time of planting, all that now has to be done, is to wait patiently for the formation, ripening, and drying of the grain.

Manuring is a very desirable practice, and, in most lands perhaps, it is necessary. It is, however, not everything in mealie growing. However, as we are on the subject, let us say now what we have to say on the matter. To secure large yields of grain the first thing that is necessary is manuring with phosphatic manures. To many this is the only kind of manuring that is necessary. In America, however, it has been found that, within certain limits, the greater the growth of stalk, the more the grain that will be secured. Farmers' Bulletin No. 199, of the United States Department of Agriculture, says, on this point:

The nature of the corn [*i.e.*, maize] plant is such that it will not produce grain unless the soil is rich enough to afford a considerable growth of stalk, and . . . *the best yield of ears is not obtained unless the stalks have made a maximum growth.*

The italics are our own. In Natal, only on the Coast has this been found to hold good, and there nitrogenous manuring is really essential if the best results are to be obtained: in fact, after two or three seasons' manuring with phosphoric acid it has been found that further manuring with this substance decreases rather than increases the yield of grain. Elsewhere in the Colony—in the Midlands and Uplands—nitrogen does not need to be added to the soil; phosphoric acid only needs to be applied—for the first two or three years at any rate: thereafter the application of potash along with the phosphoric acid is attended with beneficial results. More on these points we shall have to say on a future occasion.

For the benefit of Coast farmers, then, it may be stated that nitrogenous manuring may be done in various ways: kraal manure may be added to the soil—a method of manuring which is quite impracticable in this country over large areas;—commercial nitrogenous fertilisers may be purchased and applied to the land (a method which we would not advocate in this country for various reasons, except perhaps in certain special cases, since it must mean a lessening of the profits even

though the yield of grain is increased); and finally, green manuring may be resorted to. Of all three methods the last is the one which we would strongly recommend as the cheapest, as perhaps equally effective as manuring with commercial fertilisers, and as one which will add to the humus content of the soil perhaps quite as well as does kraal manure. Green manuring, again, can be divided into two classes—manuring with leguminous crops, and manuring with non-leguminous plants. The former method results in the addition of nitrogen in the soil, nitrogen collected from the air by bacteria living on the roots of the plants, and adds to the humus content of the soil; the latter method does not add any nitrogen, so far as is at present known to science, but it enriches the soil from a humus point of view. Obviously manuring with leguminous crops is the kind of green manuring that should be practised in connection with mealie growing.

By thus enriching the soil in nitrogen, maize plants are produced of sufficient growth of stalk to enable the plant to make the best use of the supplies of phosphoric acid added at the time of planting in the form of bone dust or superphosphate, for the formation of grain. In passing we might add that, although we have coupled bone dust with superphosphate on two or three occasions in the course of our remarks, we recommend the use of superphosphate in preference if the manure is to be added at the time of planting, since bone dust is relatively slow in its rate of disintegration, especially if the animal fat which bones contain has not been removed prior to crushing, and there is always a risk of the season's passing without full use having been made of the phosphoric acid contained in the bone dust. In manuring for a subsequent season—as, for instance, manuring at the present time for the 1910-11 season—bone dust is useful.

So much for manuring. The preparation of the soil before planting, and its cultivation after the mealies have come up, are matters that call for attention on the part of the farmer who would raise good crops. It goes without saying that the soil should be as finely divided as possible—in good tilth, that is to say. If the soil is deep, ploughing should be done as deeply as possible within the limits prescribed by the depth of the soil. This remark does not, however, apply to soils that are of a clayey nature; in such cases subsoiling should be resorted to, and at the same time the growth and turning under of a leguminous crop will be found of much benefit in rendering the soil more friable. In connection with this preparation of the land the question of the conservation of moisture is one that should receive every farmer's attention, especially in districts that are apt to experience periods of drought. Of course in Natal as a rule we have comparatively little to fear as regards lack of moisture sufficient for an ordinary growth, since we get most of our rains in the summer months; but at the same time there are seasons when the mealie crop

suffers from want of even a sufficient amount of moisture, and besides this there are many districts which do not boast as large a rainfall as would be advantageous for the mealie crop to have under ordinary conditions of cultivation. The mealie plant requires a very considerable amount of moisture in order to make its best growth: it will do with comparatively little moisture, but it does not make really good growth unless it has the benefit of a large amount of moisture. We are not going to advise irrigation, but what we would advise is the preparation of the land in order to prevent evaporation and also loss by drainage. To prevent evaporation a surface dust mulch is necessary, as by its provision capillarity is broken and the moisture below this cannot reach the surface to become absorbed by the atmosphere. To prevent loss by drainage the provision of a sub-soil mulch, as it may be termed, is requisite. In other words, subsoiling should be resorted to, in order to break up the subsoil and put it into such a condition that it will hold most of the moisture that falls as rain and sinks into it. If the subsoil is of clay and so compact as to turn water and not absorb it, it should be rendered permeable by the growth of deep-rooted crops such as lucerne, clover, etc., which will send their roots deep down into it and these as they eventually decay will leave the subsoil riddled with numerous fine passages. As regards the surface mulch to which we have referred, this is provided by cultivation after heavy rains. After as many heavy rains as possible—that is to say, when the weather appears to be settling for a dry spell—the ground between the rows should be cultivated, so that the moisture that has sunk into the soil from previous rains may be prevented from evaporating. The mulch should be as fine as possible in order to answer its purpose, without any undue proportion of clods.

The question of the depth of planting is another matter to which we may here devote a little attention. Let the depth be governed by the quality of the soil: if the soil is of a more or less sandy nature the seed may well be planted about three or four inches deep; but if it is of a heavy, compact nature one inch is quite deep enough. It should be borne in mind that, for the early growth of the germinating plant, the seed contains a certain amount of food—sufficient, in fact, for the growing tip of the plant under proper circumstances to reach the surface. If the seed is planted deeply in a heavy soil the food supplies in the seed will be exhausted before the surface is reached and thus the young plant will perish. In a light soil, on the other hand, seed planted at the same depth will have a good chance since owing to the lightness of the soil the young plant will have a better chance of pushing its way through the soil to the surface.

This article is growing in length, and we must accordingly restrict our remarks from considerations of space. A few words, however, about cultivation will suitably bring our remarks to a close, reserving whatever

else we have to say on the subject of mealie cultivation for another occasion. Cultivation should not be done too deeply, and for this reason, chiefly: that the roots of the plants come very near the surface, and there is always a danger of breaking these roots. Although the plant will send out another root to replace the broken one, this at the same time is something of a drain upon the vitality of the plant and should be avoided. After the plants have attained a height of three or four feet the soil should, even in the middle between the rows, not be cultivated to a greater depth than three or four inches. All that is necessary in cultivation is to rid the ground of weeds and to break up the crust formed by the action of heat after heavy rain, and for these purposes only very shallow stirring of the soil is necessary. There are occasions, of course, when deeper cultivation is necessary, as when the soil has become compacted after very heavy rain, but such cases are the exception rather than the rule.

With these few hints we will bring this article to a close, but we hope on some future occasion to return to the subject at greater length in the course of a special article.

Cedara Students at Wool Sales.

AN interesting departure in the curriculum of the School of Agriculture at Cedara, and one which at the same time will be attended with beneficial results to the students, was inaugurated recently in the form of a visit by a party of students, under the charge of Mr. J. J. McCall, the Wool Expert at the Farm, to one of the wool sales held regularly by Messrs. Reid & Acutt's Wool Mart, Ltd., Durban. This visit was the result of an invitation, kindly extended to the Cedara School of Agriculture by the management of the Wool Mart, for a party of the students to attend one of their weekly sales, as an object lesson in how wool is valued and disposed of in South Africa. The invitation was accepted for the sale of the 3rd of the present month, and a party of eight students was selected to attend. At 9 o'clock on the morning of the 3rd the party, in Mr. McCall's charge, visited the Wool Rooms, and, after sundry introductions to buyers and others interested, proceeded to go around and inspect the different lots catalogued. Mr. McCall had previously placed before the students about 60 samples of wool which had been sold on the previous sale, together with the firm's wool experts' valuation and the

actual price realised. This, of course, in itself was of high educational value. The students were then each given a catalogue, and under Mr. McCall's guidance were taken around the various lots (of which there were some 360 in all), to exercise their judgment in valuing the different wools. This naturally occupied the greater part of the morning; and, Messrs. Reid & Acutt having kindly provided for lunch at the Marine Hotel, the party proceeded there at one o'clock accompanied by the secretary, Mr. Anderson, and some of the buyers, whilst later on they were joined by Mr. Sidney Green, the Managing Director of the firm. After lunch the students returned to the sale rooms and attended the sale, where they had the opportunity of verifying their valuations against the prices obtained. It may be of interest here to mention that wool from the Cedara Farm was offered at this sale and obtained the satisfactory price of 10 $\frac{3}{4}$ d. for Merinos. As the students had assisted in the shearing, rolling, skirting and packing of this wool, under the superintendence of the Wool Expert, they were given an insight into what the careful handling of wool means when it comes to be realised in the open market. On the same sale there were two other lots of wool from the Loteni district, the owners of which had got up their wools personally and had followed the instruction imparted by the Wool Expert at his recent demonstration at that centre, and those two lots fetched 11 $\frac{1}{2}$ d. and 11 $\frac{3}{4}$ d. respectively, a result which hardly requires further comment.

The students who had the privilege of attending this sale deserve commendation for the interest they took in all the proceedings, and generally in all matters pertaining to the industry, and they evidently made it a pleasure rather than a duty to learn all they could. A pleasing feature of the visit was the amount of interest shown in this new departure by the buyers, both English and German, who expressed pleasure at seeing so many eager youths apparently taking delight in picking up wrinkles. As was to be expected, everyone was exceptionally busy, as it was the largest sale that had so far been held; furthermore it was an extremely hot day and very trying to tempers; but the buyers never seemed too busy to answer a question or two regarding values and condition, and one and all expressed the hope that this innovation would become an established custom in connection with the Cedara School of Agriculture.

There is no doubt that visits such as this will be of great educational benefit to the students at Cedara, and will serve to assist largely in developing their judgment—a quality much needed by every wool grower. The thanks of the Department are due to the management of Messrs. Reid & Acutt's Wool Mart, Ltd., for their courtesy in connection with this visit of the students to one of their sales, and we feel sure that much good was derived from this particular visit by the students who were given an opportunity of availing themselves of the invitation.



Helianti.

A NEW fodder plant, known as "Helianti," is beginning to attract attention in England, and was referred to in his "Farm and Garden Notes" by Mr. Geo. Carter in the August issue of the *Journal*. If the plant is all that it is claimed to be, it promises to occupy an important place on farms situated in localities suited to its growth. It appears that the plant hails from North America, and that, in its present form, it is the result of years of careful cultivation by a leading French horticultural expert. It belongs to the leguminous class of plants—one fact alone which gives it an interest in the eyes of the progressive farmer—and it is stated to make excellent green fodder, ensilage or hay (having an enormous growth above ground), and exceeds (so we learn from a leaflet that has been sent to us) both in green and dry weight and animal food the best known forage plants such as clover, sainfoin, etc. We further read that "the dry weight is alone exceeded by lucerne, the proportion being 24 per cent. in helianti to 26 per cent. in lucerne, but helianti produces no less than three times the weight of growth per acre, and according to analysis contains the extraordinary amount of over seven per cent. of sugar in the dry forage." Such statements as these would themselves be sufficient to excite widespread interest in this new plant, but this is not all, for helianti also produces "a huge crop of tubers of extreme value, in weight exceeding that per acre of potatoes several times over, and indeed rivalling that of the mangel. . . . Horses, cattle, pigs and sheep all eat them greedily and do well upon them. Horses prefer them to mangel even when fresh raised. Cows do well and give more milk and butter when fed upon helianti either as tubers, hay or ensilage, and the butter possesses the very best of flavour, even better than that produced by feeding lucerne. Pigs fed upon the tubers make the best flavoured pork on the market. Poultry feed well and fatten quickly upon a mixture of half-cooked tubers and bran." As might be expected, however, a heavy crop of forage and of tubers cannot be raised the same season; if a crop of tubers is desired, then no

forage must be cut, but all allowed to mature. The dense growth then dies back, and the tubers resulting may be raised late in the autumn.

An idea of the food value of *helianti* may be gathered from the analyses which have been published of the tubers, stems, and leaves of the plant. The leaves are said to contain: Proteids, 3.50 per cent.; fats, 0.66; total sugars, 0.44; carbohydrates, 13.88; cellulose, 1.61; digestible fibre, 1.25; insoluble minerals, 1.90; and water, 76.10. An analysis of the stem has given the following results: Proteids, 3.10 per cent.; fats, 0.13; total sugars, 7.18; carbohydrates, 9.15; cellulose, 3.61; digestible fibre, 0.83; insoluble minerals, 0.40; water, 75.60. The tubers analyse as follows: Proteids, 5.31; fats, 0.48; sugars and carbohydrates, 18.65; cellulose, 1.32; minerals, 1.76; water, 72.48.

This new fodder plant is certainly worth a trial in this country, providing our climate will suit it. About this there does not seem to be very much doubt, however—in the midland and upland districts, at least—in view of the statement which has been made to the effect that in 1906 it withstood a great drought in France, Algiers and elsewhere better than any other farm plant, and that it is equally hardy in standing frost and heavy rainfall. It may be that it has already been introduced into Natal, and if that is the case we should be glad to hear from anyone who has had any experience with it. We may add, in conclusion, that the tubers can be allowed to remain down three or four years without lifting, which is a further point in its favour. Mr. Carter is obtaining a few of the tubers for trial, and the result of his experiment will be awaited with interest.

Examination of Potatoes Entering O.R.C.

Notification has been received from the Director of Agriculture of the Orange River Colony to the effect that, under O.R.C. Government Notice No. 68, 1907, all consignments of potatoes entering that Colony, or offered for sale, which in future appear on examination to be infested with the disease White Rot (*Nectra solani*, Pers.) or any other disease, except Black Scab (*Chrysophlyctis endobiotica*, Schil.), will until further notice be re-sorted at owner's expense, a charge of 6d. per case or bag being made in order to cover the cost of re-sorting. All consignments of potatoes which are found on examination to be infested with Black Scab (*Chrysophlyctis endobiotica*, Schil.), will not be re-sorted but will be confiscated and destroyed. The Director of Agriculture concludes: "Farmers and merchants should note that Black Scab or warty disease of the potato (*Chrysophlyctis endobiotica*, Schil.), has not yet appeared in South Africa; it is therefore of the greatest importance to prevent its being introduced."

Enquiry for Cigar Boxes.

We have received from a correspondent a request to be placed in communication with a manufacturer of cigar boxes. Should there be among our readers any persons engaged or interested in the manufacture of these boxes, we would be glad if they would communicate with us as early as possible.

Milk-Giving Sheep.

In pursuance of an enquiry by one of our farmers respecting Hungarian milk-giving sheep, the Commercial Agent for Natal addressed a letter on the subject to the Secretary of the Co-operative Association of Hungarian Farmers, and he has received a reply stating that the sheep are extraordinarily hardy, being kept in the open during both the summer and winter months. The percentage of fat contained in the milk from the Hungarian milk-giving sheep is stated to be large and the wool is long and good. Eighty per cent. of these sheep bear twins. The Co-operative Association of Hungarian Farmers state that they are convinced that this class of sheep would be much appreciated in Natal. Shipping would be practically effected in lambs. The most convenient port of shipment in Hungary is Fiume. The price of such sheep is from £3 to £5 per head according to quality.

Prices of Mutton.

Advices from London go to show that wholesale prices of frozen mutton and lamb in the United Kingdom have undergone what is stated to be an unprecedented advance, owing it is explained, to unexpectedly short shipment from the Argentine, as the result of drought, and also from New Zealand and Australia. It would seem that this increase in wholesale prices will not necessarily result in a rise in retail prices, inasmuch as butchers have for some time been buying frozen mutton and lamb on exceptionally favourable terms, which have not been reflected in reduced charges to the consumer. The remarkably low level at which prices have ruled during the summer in the wholesale trade is shown by the following figures referring to New Zealand (North Island) mutton and lamb, taken by the London *Daily Telegraph* from a meat circular issued by one of the leading meat importers. The prices for August of last year are given for purposes of comparison:—*Mutton*: May 28th, 1909, 1½d. to 2½d. per lb.; August 13th, 1909, 1½d. to 2½d. per lb.; October 15th, 1909, 4½d. to 4½d.; August 13th, 1908, 3½d. to 3½d. *Lamb*: May 28th, 1909, 3½d. to 4½d.; August 13th, 1909, 3d. to 3½d.; October 15th, 1909, 4½d. to 5½d. per lb.; August 13th, 1908, 5½d. to 5½d. per lb. These figures show the great jump that was made in prices on the 15th of last month. All classes of mutton and lamb were correspondingly low during the 1909 summer.

Natal Sugar Association.

We are pleased to be in a position to inform the readers of the *Journal* of the formation of a Natal Sugar Association representing sugar planters, sugar manufacturers, and others interested in the Natal sugar industry, with Mr. John Kirkman, M.L.A., as president, and Mr. Jas. McBride as vice-president. The Association has been formed with the object of the promotion of the general welfare and advancement of the sugar industry and the improvement of the quality of its products and the better co-operation of growers and manufacturers and merchants who deal in sugar.

Hail Prevention.

We have received from the Commercial Agent for Natal a copy of a letter which was received by him in reply to a letter which he addressed to His Majesty's Charge d'Affaires in Berne regarding hail prevention. It is stated in the letter that experiments have been carried out in Switzerland with a view to preventing hailstorms by shooting, but that, this method having proved inefficacious, no methods of hail prevention or for the protection of trees from hail are now adopted in that country. The measures now adopted with regard to damage by hail are confined to insurance by the Cantonal Governments and to the grant by the Confederation of subsidies for the encouragement of such insurance. According to the recent statistics published by the Swiss Department of Agriculture, the Confederation granted to twenty Cantons in 1907 the total sum of £6,547 for this purpose.

Caravonica Cotton.

The Department of Agriculture has received from Messrs. S. A. Nathanson Commandite, P.O. Box 261, Durban, a letter stating that they have secured the sole agency in South Africa for the Caravonica Cotton Central Office. They are disposing, under certain conditions, of specially grown seed (produced by Dr. Thomatis after many years of experimenting) the cotton grown from which they guarantee to be of the finest quality so far known, higher prices, they state, being paid for this cotton than for any other cotton in the market. They bind themselves to buy, or, if growers prefer, to sell for them in Europe, any quantity at a fixed price for years to come; and the conditions on which they supply seed (which they do free of charge f.o.r. Durban) are: (a) Intending growers must make application to Messrs. S. A. Nathanson Commandite for Caravonica seed, stating situation, size, and proprietor of farm; (b) growers must follow the instructions furnished with the seed *re* cultivation and must allow Messrs. S. A. Nathanson Commandite to inspect the cultivated area at any time; (c) Messrs. S. A. Nathanson Commandite to receive five per cent. of outturned crop, either in cotton or cash at option of growers.

A New Baling Press.

A new baling press has been put on the market by Messrs. Shirliff Bros., Hampton Hill, Middlesex, England, under the patented name of the "Bijoli" Baling Press. This press has been scientifically designed to give a gradually, but enormously increasing pressure on the bale, as it is required, while at the same time keeping the motive power almost constant. The press can be worked by hand power, animal power, or by a belt off any prime mover, such as a steam, gas or oil engine, electric motor or water wheel. They are also built in two types, to suit different requirements as to head room. Where the head room is limited, they are inverted. It is worked by turning the winch which winds in the wire rope and pulls the system of levers together, thereby pressing down the follower or pressing platen. When the bale has been fastened with rope lashings, wire or steel hoops, the press returns to its initial position when the brake is released. It is stated that no foundations are required, but only a small hole has to be dug, into which the lower beams are bedded and the press set plump. The press is practically made entirely of mild steel, only some parts of the winches being of cast iron.

Mealie Grub and Totofianas

The following notes are extracted from a letter received by the Government Entomologist from Mr. C. T. Brookes, dated 28th October, 1909, which are of much interest in connection with the development of the mealie grub and totofianas. Regarding top grub, he says:—"Upon reference to my diary, I see that upon the 2nd of June last whilst reaping our patch of mealies numbers of pale pinkish caterpillars were found in the pith of the cob." (From the technical description given by correspondent, Mr. Fuller says these were the larvæ of the mealie grub.) "Later at Umsinga I kept under observation a small patch of drought-starved mealies, and during the whole of June and July I obtained grubs from these, but not one pupa. On October 5th I examined some mealie stalks here at Tugela Ferry, obtaining several larvæ and one empty pupa shell. To-day, 28th October, I examined a native's plot from which a good crop of amabele had been reaped, and from this I obtained a large number of pupæ and larvæ. The pupæ I found in all positions, from the bottom joint of the stem upwards. The larvæ taken at Umsinga were found similarly situated. The fact of their being no green mealies within a mile of the amabele I examined to-day proves beyond doubt that the larvæ do not feed again after hybernation; further I found that the few juicy stalks of imphe had no larvæ in them. Many empty pupa shells that I secured to-day were surrounded by a mass of little white cocoons, each enclosing a small red pupa, from which the insects had already emerged" (Mr. Fuller remarks that this parasite of the mealie grub is not infrequently met with.)

Regarding locusts, Mr. Brookes says:—"The red-wing locust is here, but not abundant. So far none have been noticed *in copula*. I have seen hoppers, which the natives say are 'Intotofianas'; these go about in swarms of 50 to 500, and I have noticed them since April last. About an equal number of each swarm are striped yellow and black and green and black; possibly the sexes are so differentiated at this stage." Writing under date of the 19th November, Mr. Brookes adds that of the 20 pupæ of the mealie grub under his observation the majority have emerged as moths. The first moth was found upon the morning of the 2nd November.

Watering Sugar Estates.

In the *International Sugar Journal* for September appeared a statement that "some recent attempts have been made in Natal to simulate rain by means of water squirted overhead," the *Journal* adding that, according to an engineering paper, "very successful attempts have been made with a machine working on the fire-engine principle sent to one of the Natal sugar estates by Messrs. Gwynne, the pumpmakers, of Hammersmith." Proceeding, the *Journal* says: "The equipment consists of a powerful petrol tank on which there is mounted a high-pressure centrifugal pump. This pump can be coupled direct with the engine, and is capable of delivering 250 gallons of water per minute against a pressure of 75 lbs. per square inch. The two delivery branches are connected with $\frac{3}{4}$ in. nozzles, and will produce jets of water 120 ft. high. The machine can also be used as an agricultural tractor, when it will haul a three-furrow plough or any other implement, or drive a 4 ft. 6 in. threshing machine. In working order, the vehicle weighs about $2\frac{1}{2}$ tons. The tractor, by Messrs. Dennis Bros., of Guildford, is provided with a gear box, having three speeds forward of two and a half, five, and ten miles an hour, and a reverse gear controlled by a lever conveniently placed near the driver. The road wheels are of wrought steel, with cast steel hubs and cast-iron bushes, giving large wearing surfaces. The rear wheels are 10 inches wide, with diagonal steel strips, and are so arranged that an extra widening ring can be quickly attached for use in exceptionally soft ground. The total width of wheel is then 14 or 16 inches. In addition, angle-iron spuds or grips can be fixed to give the necessary hold on the ground for traction purposes."

On reading this announcement we communicated with the leading sugar estates on the Coast, with a view to ascertaining which particular estate had taken this interesting step; and we were particularly interested in the statement that "machine can also be used as an agricultural tractor, when it will haul a three-furrow plough or any other implement," etc. We eventually got into touch with the estate concerned (we have

not had permission to mention the name of the estate, but may say that it is a large one on the South Coast), but we learn that, although the plant in question has been ordered, it has not yet arrived in Natal, so that the statement that "very successful attempts have been obtained" is hardly correct if it be understood to mean that the attempts have been made in Natal actually. The manager of the estate which is importing the plant has kindly promised to communicate with us again as soon as the plant arrives and practical tests have been made, and we will thus probably be enabled to publish an article on the subject in due course.

Drying Maize.

Discussing the ripening of maize, in its issue of the 4th September the *Louisiana Planter* refers to the practice adopted by many large maize growers in the United States for the purpose of forcing the drying of corn. "They go through the fields with a stick and hit the corn stalk just below the bottom ear [cob]. This bends the upper part of the stalk with its one or two ears so that it will fall downward. This will better protect the ripening corn from rain and from the birds," our contemporary remarks, adding that "the motive in bending the stalks in this manner is to break up or stop the circulation of moisture in the plants and thus force the drying of the cobs."

Destruction of Moles.

In a recent issue of the *Journal* we published a short article on the subject of mole destruction, in response to inquiries which had been made by readers. We have now received a leaflet from the Agricultural Experiment Station at Lincoln, Nebraska, on the same subject, which contains some further information which may be found of use by those of our readers who are being troubled by the depredations of moles in their fields. As effective and at the same time comparatively inexpensive methods of combating and destroying pocket gophers (whose habits resemble very closely those of moles), the writer of the leaflet suggests the following in the order of their importance and effectiveness.

TRAPPING.—This is perhaps the safest method, if not the quickest one, of getting rid of pocket gophers, etc. By setting steel or other traps in conformity with the habits of the gopher when working in his burrow, *i.e.*, by getting them far enough down in the main runway so as to insure the animal's crossing the trap when coming to close up the opening, the trap will be sprung and the victim secured. There is very little difficulty in catching them after one has had a little experience in placing traps. [We understand that mole traps can be obtained locally—at any rate in Maritzburg.—Ed., *Agr. Jnl.*]

POISONING.—These mammals can also be quite readily poisoned. In doing this, a very active poison must be used, as, for example, strychnine or cyanide of potassium, and this must be placed in the main runways below the surface by dropping the bait through openings made with a dibble of some kind. This opening should then be covered over. Poisoning should never be done by throwing the bait into the mouth of an open burrow, as the animal is very apt to push the poison out along with a load of dirt, and in that way endanger the lives of various farm animals. Poisoned raisins or pieces of potato or apple may be dropped into the main runways with excellent result. In employing poison for the destruction of moles great care is, of course, always necessary so as to avoid all possible chance of poison to the operator as well as to everything else not intended to be killed.

BISULPHIDE OF CARBON.—"Some persons have reported success by the use of this substance," the writer of the leaflet says, "but our personal experiments have not been at all satisfactory when trying to kill gophers with it. The animals seem to scent the danger and plug up their burrows and thus escape. It might answer well in short burrows, but sometimes . . . the burrows are long and would require an immense amount of fluid to be effective."

Quibell's Patent "Cattle Washer."

This apparatus, for which Messrs. W. H. Griffin & Sons, P.O. Box 272, Maritzburg, are the agents, is intended for the use of owners of more than ten, but less than about 100 head of cattle. Above this number it would be more economical to erect a full-sized plunge dip. The idea which is embodied in it is, that in place of laborious and unsatisfactory spraying, whereby the underparts are frequently only half wetted, the animal in this machine stands with the whole of the underparts completely immersed in this dip. With a hose of sufficiently large diameter the wetting of the upper parts is a simple matter. To train fresh animals, it is well to walk them through the empty tank three or four times, then let in say a foot of dip and walk them through again. One man works the pump above while another, manipulating the hose, carefully washes or hoses down the ox, working always from behind against the set of the hair, and finishing off by washing out the ears and over the face. After all the animals are finished, the store tank lid is opened and the nozzle inserted; the whole of the dip can then be returned to the store.

The following description of the tank has been furnished us by Messrs. Griffin & Sons, and will probably be read with interest by stock farmers:—The tank can be built of any available materials, since between

dippings it stands empty. The maximum depth below the ground line is 3 feet 6 inches, and the stand at this depth is 4 feet long, being raised 4 inches at the gate end. The horizontal length of the entrance and exit are each 10 feet. Splash boards should be erected along the sides to a height of at least 18 inches. The maximum width need not exceed 3 feet at the ground line, and should not be more than 1 foot at the bottom of the stand, in order not only to economise the dip, but to discourage undue activity on the part of the animal. From either end of the four foot stand, the tank should taper to the ends down to 2 feet 6 inches. To one side of the entrance, and close to the tank, is a platform on rough poles, about 12 feet high and on these is mounted a cheap 2-inch lift pump which draws its supply from the deepest part of the dipping tank. The pipe for this should be led in from the side underground, and should come flush with the walls, so as not to catch the animals' feet. The pump delivers into a barrel or drum, on top of which is any available strainer, such for instance as a piece of No. 10 wire mesh twisted into a cone. At the bottom of this barrel is fitted a piece of canvas hose, $1\frac{1}{4}$ or $1\frac{1}{2}$ inch diameter, and fitted into the end of this to serve as a nozzle, is a short piece of iron gas pipe 1 to $1\frac{1}{2}$ inch diameter. The hose should not be less than 18 feet long. At the forward end of the dipping tank is fitted a gate, made to open outward, the bottom of which should about touch the water when the latter is say 3 feet deep. The gate is hinged to a strong post driven beside the tank, and closes to a similar opposite, and catches there by an iron bar or bolt. The object of the gate is to discourage the cattle from jumping the length of the tank instead of walking through. When in place, a slip rail should be pushed in behind the animal, or the rail may be hinged to fall into a groove. A draining pen large enough for five or ten head should be provided for at the exit, and gutters should lead into a sump, the overflow of which back into the dip, should be provided with a gate to catch foreign matter. Under or near the pump is placed an ordinary standard 400 gallon tank, and this should always be made up full when the dip wastes down to exactly 300 gallons by measure of gauge, *i.e.*, mix another 100 gallons at same strength and fill tank, thus the standard strength of the dip will remain unimpaired. The storage tank is fitted with a watercock and short length of pipe.

Do not feed too much hay to your horses. Better to give a little more grain than to overload your horses with this coarse stuff. A horse could starve to death on hay.

The International Road Congress, Paris, 1908.

By J. F. E. BARNES, C.M.G.,
Chief Engineer, P.W.D., Natal.

THROUGH the good offices of the Consulting Engineer I have received a publication written jointly by G. Montagu Harris, Secretary to the County Councils' Association, and H. T. Wakelam, M.Inst.C.E., County Engineer and Surveyor of Middlesex, descriptive of the First International Road Congress, which was held in Paris in 1908.

The work is published by Wyman & Sons, Ltd., Fetter Lane, London, E.C.

A perusal leaves the conviction that, though good work was done, much yet remains for future conferences to consider and to decide upon. This view of the matter is reflected by the following quotations from Chapter XXIV.:-

"It cannot be said that any universal panacea was arrived at as the outcome of the resolution adopted; nevertheless, the Congress was able to lay down some definite rules which will enable the technical experts to give roads a greater resisting power against the injuries caused by the new methods of locomotion. Under these circumstances, it is clear that a certain time must elapse before the results arrived at can be actually realised and put into effect, and that a second Congress must be called to confirm and verify the principles laid down in the first. Moreover, since tests on roads necessarily require a long period before their effects can be properly estimated, it may well be that no complete solution can be found until a certain number of Congresses shall have been held.

"It follows from these considerations that it is fully recognised that there would be great advantages in the establishment of a permanent Commission which would centralise the results of studies and experiments made throughout the world and would make the arrangements for full meetings whenever necessary."

It is satisfactory to note the establishment of "A Permanent International Commission of Congress with the object of furthering progress in the construction, maintenance, traffic and working of the road, and also for providing in future for continuing in the work of the Congress," it was approved, moreover, "that the Permanent Council is charged with the organisation of the next Road Congress which will be held at Brussels in 1910."

Meanwhile, *inter alia*, it will be the duty of the Permanent Council to consider the centralisation of the results obtained from the various

experiments made in all countries and if necessary to cause fresh experiments to be undertaken with a view to fixing standards, particularly of tar and other substances and for materials of construction, including steel, cement, etc.

The first Congress was convened by the French Government, who invited all nations to take part. 2,250 persons, representing 27 different countries, responded. Of these Great Britain sent 126, made up largely of county and borough surveyors. The representative of the British Government was Mr. H. Percy Boulnois, M.Inst.C.E., Deputy-Chief Engineering Inspector of the Local Government Board, while the delegate of the Irish Local Government Board was Mr. P. C. Cowan, B.Sc., M.Inst.C.E., Chief Engineer to the Board.

The United States of America had a representative.

There were nineteen French official delegates representing the Departments of the Interior, Foreign Affairs, Commerce and Industry, Colonies, Public Works, etc., while Germany and Belgium each sent ten, but apparently there were no representatives from India or the British Colonies.

EXHIBITS

embraced interesting specimens of road appliances, steam rollers, tarring machines, road plant, sweepers, etc., specimens of various classes of pavements and of road construction were visited and inspected, as were also specimens of chemically treated wood block as comparison with blocks creosated under pressure.

The number and variety of tar painting machines pointed, it is remarked, to the fact that "a great call for such machines was anticipated," while as regards steam rollers, it is mentioned that during the Exhibition an English firm secured orders for no less than sixty-eight rollers.

The straight, practically level, paved, asphalted or tar painted city roads of France have but little practical interest for us in Natal where the circumstances respecting gradients, traffic, and, above all, expense, are so widely different. As, for example, the *upkeep* of a section of the Bois de Boulogne about one mile in length in 1905 was £1,000, in 1906 £1,400, and since 1906 that length had been twice tarred at a cost of £200. Speaking, however, of a visit to Versailles it is remarked that "the roads on the outward journey within the City limits and through the Bois de Boulogne were in a fair state of repair, but outside the City gates they were very poor indeed both in section and condition. At St. Cloud the *Route Nationale* was struck and traversed to Versailles. The camber of the route was very considerable compared with the English practice, being in many parts as much as one in twelve from the crown of the road to the channel. At Ville de Roy the abnormal transverse section of the road appeared to be positively

dangerous to the traffic. Quartzite and porphyre appeared to be the chief materials used for metalling the roads, the former being in all cases in a much better condition than the lengths maintained with the latter material," and again, referring to outlying places, the following extracts are worth quoting:—

"The road towards Choisy-le-Roi is raised several feet above the land level, and is supported by banked slopes without fencing of any kind. Following the route for two or three miles, the town of St. George's was reached, the main street and footways of which are paved with granite setts of a kind similar to those in use in and about Paris. The carriage way was very narrow, and in appearance it looked neither well-cared-for nor yet presented a creditable appearance from a reparation point of view.

"Following the *Route Nationale* through Montgeron the first tar-painted length of carriage-way was reached. There was no traffic on the road, which was lined with the well-grown trees so commonly seen along the roads of Continental countries. Past Croix Villa, the *Route Nationale* was kerbed with stone on both sides, which kind of edging extended for many miles, and which, with the absolute straightness of the routes, the continuous complete avenue of trees, and the forest, causes the journey to become both tedious and monotonous.

"No hedges exist along the roads as in England, and side roads are, in most cases, many miles apart.

"The condition of the tarred sections was infinitely better than that of the lengths untarred, the latter, in many places for considerable distances, being in an extremely poor state of repair.

"About three hundred members of the Congress were conveyed to Nice from Paris by special train on Sunday, October 18th.

"On Tuesday, the 20th, the delegates were taken to view the wonderful serpentine mountain roads of L'Escarene and L'Anthion. These roads have gradients of about one in ten, with exceedingly sharp curves, the latter having no proper banking-up on the usually super-elevated parts. It was with great difficulty that the heavily laden cars, in which the party were conveyed, manipulated the sharp twists and curves. The metalled surfaces of the roads had a width of about sixteen feet, and were in a fairly good state of repair.

"On Wednesday, the 21st, the party went for an excursion by the Corniche road to La Turbie and Monte Carlo, the roads traversed having been built by Napoleon I., and since much improved. They were in a good condition from Nice to La Turbie, but from the latter place to Monte Carlo the surfaces were not so good. The dust nuisance made itself felt along this stretch of country, in which attempts had been made to carry out surface tar-painting, but with little success.

"At Nice a length of road was under construction in what is

termed locally 'armoured' asphalt, the cost of which was stated to be about 13s. per square yard exclusive of the foundation of concrete."

As to

ADMINISTRATION

it appears that in practically all the European countries (*viz.*, Spain, Italy, Holland, Belgium, Austria, Saxony and Norway) their roads are dealt with by Central Government Departments. This is also the case in India. The roads of England alone are, on the other hand, under County, Town, and District Councils, totalling 1,896 in number. Those of Scotland under 222 County and Burgh Councils, and those of Ireland under 373 County and District Councils, County Boroughs, etc., without any central supervising or intelligence department.

In France, Spain, Italy and Belgium, there are national organisations of road men.

The opinion that England should give up her "exceptional position in this matter is expressed in a paper which points out that the matter of roads in Great Britain is too vast for any parochial or county body to undertake. The roads, and most urgently the main ones, must be placed under a central authority. Some anomalies which would thus be avoided are:—

(1) "At present the roads of a district are probably most used by non-residents, who 'wear' the surfaces but do not contribute towards the upkeep.

(2) "Experiments cannot be undertaken, even by a county authority, with any sense of financial equity to the ratepayers.

(3) "Owing to the absence of suitable road-making materials in many districts, the cost of constructing highways varies to a great degree.

"Therefore, says Mr. Hinde, the author of the paper, it seems as though we are forced to the conclusion—both on the grounds of equity to the ratepayers as well as of securing the best results—that the whole subject of roads should be regarded as a national one. Latterly the British Parliament has shown some interest in town planning as opposed to the haphazard way in which English cities have been developed. Similarly, the question of road planning will have to be considered by a central Government department, the functions of which might include:—

(a) "The establishment of a bureau of information concerning the practice of other countries with regard to the construction of roads.

(b) "The collection of data with reference to new road material, the compilation of records as to the behaviour of various types of road, and the classification of material in order of utility for special conditions.

- (e) "The organisation of a department for providing machinery and equipment for districts where—as in Ireland—steam rolling and other modern methods have had to be disregarded on the score of expense.
- (d) "Working in conjunction with the Ordinance Survey, a road plan of the county should be prepared, with a view of straightening roads that at present are tediously zigzag in form, securing short distances instead of roundabout courses between important towns, and advising with regard to proposed new roads and highways.
- (e) "Undertake the maintenance of all main roads, and so secure a desired uniformity in surface and construction.
- (f) "The encouragement of experiments likely to serve the national purpose.
- (g) "A general liberty of action with regard to subjects coming within the category of roads."

The necessity for easy camber of road is called attention to particularly in respect to motor traction, as is also the necessity of rolling the subsoil before laying materials of construction.

On page 41 Mr. R. J. Thomas, M.Inst.C.E., county surveyor, Bucks, and delegate of the Association of County and Municipal Engineers, points out that "very few English country roads have either rubble or hand-packed foundations; that the majority are carried by layers of small stone in varying thickness laid upon the subsoil, following the Macadam rather than the Telford principle of construction. (The latter did not always carry out what he advocated, *viz.*, a hand-packed foundation," and as an example quotes Telford's noted Holyhead Road, which where opened up for reconstruction in Carnarvonshire, possessed no hand-packed foundations.

I may say here that this fact I am much pleased to note, as my own experience and practice for many years have lead me to abandon the Telford system, not only on the score of cost, but also because undoubtedly Macadamising gives better results. Telford's foundation-paving *invariably* works up to the surface in a few years. The metalling and binding material finds its way to the bottom, where it is, of course, useless. A rough and unequal road is the result.

As a local example I may state that in 1883 in taking up the appointment of Borough Engineer, Durban, I found the Umbilo Road being constructed under contract by Mr. Shires to a specification based on the Telford system. Half the work, or about two miles, had already been finished. The hand-packing and all else had been most carefully and conscientiously done. Acting on experience gained in the north of Ireland during the ten previous years, I at once altered the contract specification, and the remaining two miles of the Umbilo Road were

finished on the Macadam system. Since then, both as Borough Engineer and after, I had the pleasure of seeing the incomparably better results obtained by the Macadamised portion to those of the Telford. The former wore evenly and gave but little trouble, while on the latter, the foundation so persistently worked to the surface that within three years of its being constructed, I had to send a gang with sledge hammers over the Telford two miles to *break down* the projecting paving stones.

In support of these views it is satisfactory to note that the present Borough Engineer, Mr. Fletcher, the excellence of whose roads speaks for itself, also follows the system of Macadam.

In practice the Telford system should only be adopted in special cases where a faulty natural foundation requires to be artificially remedied. Moreover, the cost of a Telford-built road is nearly double that of a Macadamised road.

On the subject of *cost*, the Congress report furnishes useful and interesting figures. A list of the comparative cost of road maintenance in various countries is as follows:—

<i>Country.</i>		<i>Mileage.</i>	<i>Total Annual Expenditure.</i>
England and Wales	...	149,759	£13,495,204
Scotland	...	24,615	1,220,503
Ireland	...	54,064	1,174,941
France	...	23,820	1,224,588
		(Routes Nationales)	(Routes Nationales)
Spain	...	*23,720	1,479,313
		(High Roads)	(High Roads)
Switzerland	...	—	434,155
Austria	...	10,018	673,970
		(Imperial Roads)	(Imperial Roads)

These figures give the average annual cost per mile of road in

	£	s.	d.
England and Wales as	90	2	0
Scotland as	49	11	6
Ireland as	21	14	6
France as	51	8	6
Spain as	62	5	0
Austria as	67	5	6

Taking the average of these six countries as fairly representing that of Europe we get the cost per mile of road at £57. That was for the years 1905-6, since when the rate has considerably increased.

In England and Wales the average cost to the counties for roads repaired by *Urban* District Councils was £226 per mile, and by *Rural* District Councils £69 per mile.

A list taken from the Local Government Board returns for the year

ending 31st March, 1906, gives the *mileage* of main roads directly maintained by the County Councils (practically rural roads only) and their annual cost per mile. Of the 50 items given, I take the following 20. The *least costly* of English counties are:—

Huntingdonshire	...	£38 per mile	} <i>Least costly,</i>
Norfolk	...	38 "	
Salop	...	47 "	
Rutland	...	50 "	
Cumberland	...	52 "	

Then we have—

Berkshire	...	£68 per mile	} <i>Medium,</i>
Staffordshire	...	77 "	
Northamptonshire	...	83 "	
Derbyshire	...	88 "	
Worcestershire	...	99 "	

and—

Monmouthshire	...	£104 per mile	} <i>Amongst the Highest;</i>
Cheshire	...	107 "	
Essex	...	137 "	
Kent	...	151 "	
Durham	...	168 "	

while for Middlesex the figure is £556 per mile.

In *Wales*:—

Merionethshire	...	£18 per mile (<i>the lowest</i>)
Pembrokeshire	...	53 " (<i>medium</i>)
Glamorgan	...	202 " (<i>highest</i>)

As examples of urban main roads seven are given. Of these the extremes are:—

Devon, with practically no through traffic, is the lowest. 248 miles cost £83 4s. 2d. per mile per annum.

Kent, adjoining London and with much traffic to the coast but not to other counties. 148 miles cost £409 3s. 9d. per mile per annum.

-As to

COST OF CONSTRUCTION,

reduced to English pounds and miles:—

For France the normal cost is £825 to £1,650 per mile. In hilly country it will amount to £2,550 per mile. For secondary roads—in level country, £385 to £825 per mile, and £825 to £1,375 per mile in the mountains. For the smaller roads £275 to £330 per mile.

As, however, the conditions of America may be considered to more nearly approximate to those in Natal than do European countries, the following records from page 73 of the report are of interest:—

The area of the United States of America, excluding Alaska and island possessions, is 2,970,038 square miles. In 1904 the road mileage was 2,151,570 miles. Of this great mileage, 155,662 miles (about 1-14th) only were improved. Of the mileage improved 108,232 miles

were surfaced with gravel; 38,621 miles, or less than 2 per cent. of the total mileage, were hardened with stone; while 6,809 miles were made of sand and clay mixtures, oil, shells, etc. Since 1904-5 the office of public roads of the United States Department of Agriculture has been assisting local bodies in various parts of the States to build short sections of roads as object lessons.

In 1908 the average cost of roads in the Pacific States, with Macadam surface 15 feet wide, was about £1,550 per mile, or about 3s. 6d. a square yard. In the Western States the average per square yard was 2s. 9d.; in the Northern States the average per square yard was 3s. 1d.; the formation being from 8 inches to 9 inches deep. The average rate works out at 3s. 1 1-3d.

Now to apply these costs to Natal, it was only last year that one of our leading papers compared Natal roads to those of Kent, to our disadvantage, of course. But considering that the rate per mile for the upkeep *and* improvement work on Natal roads is barely £10 a mile, while Kent spends £151 per mile, it will I think be readily admitted there is no room for comparison.

As compared with American cost of *road hardening*, 3s. 1 1-3d. per square yard, and which is cheaper than that of European countries, Natal again comes *easily* first, as our rates for macadamised and steam rolled roads are *well under* 2s. per square yard. (See my annual reports for the past and previous years.)

As I have many times advised in my annual reports, it is to the interests of Natal to push on with her road improvements now, while these low rates are obtainable. Certain it is that they will not always be so. The fact that such work costs us less than other countries is a matter for congratulation.

The Conference strongly favoured the application of tar on public highways. To bring our macadam roads up to date and fit for motor traffic it only remains for the making of tar to become an established industry in Natal based on rates satisfactory alike to manufacturers and purchasers, and we can then easily afford to *tar paint* our finished roads, thus adding to their life and to the comfort of travellers.

That road improvement is now more than ever necessary, owing to the altered condition of road transport due to Tick Fever, is self evident. Every farmer now, more than heretofore realises the advantage of a hard road surface and easy gradients.

It is only to be expected that motor traction will ere long demand, even better roads than those which suffice for horses, mules, or donkeys, but while admitting the equity of the demand, it must not be forgotten that in order to render such improvement possible from a financial point of view, motor traffic must submit to restrictions considerably greater than those now existing, *i.e.*,

- (a) Speed must be limited;
- (b) Wheels must be more suitable for and less harmful to the road surface;
- (c) The weight of the tractor when employed in hauling trailers and the load so hauled, must be limited to a reasonable weight per tractor wheel, or better still, the use of traction systems of the Renard Road train type should be encouraged.

As to the direct bearing of increased motor traction to increased maintenance cost, the following figures from page 114 are eloquent:—

"The cost of the roads in England and Wales has steadily risen during several years, partly by reason of the demand for a higher standard of road surfaces to meet the new forms of locomotion and the general expansion of all kinds of traffic. At present there are about 8,500 traction engines in England and Wales, which necessitate the provision of stronger road surfaces and foundations with a corresponding increase in maintenance. Since 1896, when the use of automobiles was legalised, their number has steadily increased and correspondingly to their growth the main roads' bill of England and Wales has also increased, as the following figures will show:—

Year.		Motors.		Rate of cost of road maintenance per mile.
1904	...	51,549	...	£86.9
1905	..	74,058	...	£87.9
1906	...	86,536	...	£90.7
1907	...	125,320	...	£91.8

"In 1901 the average rate per mile was but £76 1s.

It is averred that, apart from any further increase in motor traffic during the next few years, *extra* expenditure will be needed to repair the damage already caused to the roads and not yet made good. It is stated that the effect of automobiles has been to greatly increase the necessity for an improvement in the quality of the metalling spread on the roads. The cost of abandoning the flints, gravel and limestone surfaces of the 4,500 miles of main roads now coated with these materials out of the mileage above given for England and Wales and providing them with coats of basalt or granite would be about £5,000,000, which expenditure can only be gradually undertaken.

"A chief cause of the unusual damage caused by motor traffic is attributable to the defective design of the wheels, and the damage is increased where the *wheel* is the medium of *motive power*."

It is particularly remarked that the roads have suffered greatly from the small diameter wheels of the commercial motor, while the armoured wheel tire has proved to be a "potent instrument of road destruction."

"The teaching of Morin and others demonstrating the saving gained by the employment of *large* wheels in reducing resistance to traction, have been ignored by those responsible for modern vehicles, with the result that much damage is being caused and a serious financial burden is being placed on the shoulders of the community by reason of the wheel of the automobile being far more destructive than anything hitherto seen on the roads."

For automobiles a maximum speed not exceeding 25 kilometers (about 16 miles) per hour, and for heavy industrial motors 15 kilometers (9½ miles) is recommended, the *average* speeds in each case to be about one-third less. The heaviest axle weight not to *exceed* 5 tons nor 840 lbs. per inch on tires. The driving axle to have metal tires provided these have smooth faces.

RENARD ROAD TRAIN.

Special attention was called to the Renard Road Train as being the system to which we must look for reducing the cost of maintenance, as by it alone is the propelling stress divided over the entire train."

With this opinion I am in complete accord. The injury inflicted by the traction engine greatly detracts from the value of the ordinary tractors.

The adoption of motor traction throughout the Colony in a haphazard manner and without preparation cannot be thought of. That which must be done is:—

- (a) To make selections of the more useful roads those preferably which are feeders to towns and railway stations in districts not provided with railways:
- (b) On such selected roads, gradients must be reduced and at least all inferior portions hardened or macadamised. When this has been done a proper system of traction should be established, preferably under district control, though possibly subsidised by Government.

It has just been shown herein that to macadamise 4,500 miles of roads in England and Wales is estimated to cost £5,000,000. That mileage, together with the 500 miles already hardened in Natal, would very nearly complete the roads of the Colony, but the cost estimated at but *half* the foregoing, would amount to the enormous expenditure of £2,500,000.

Assuming, moreover, that this large sum were forthcoming, so great an extent of macadamising or hardening could not be carried out in any limited number of years. That, however, which could, and I consider should, be done is to lay down a permanent policy whereby from year to year £10,000 to £20,000 or some such reasonable amount, could be

set aside for road improvement work quite apart from maintenance. In this way material advancement would be brought about in a few years.

It must never be forgotten that Natal is an extremely broken and hilly country abnormally well watered by numerous streams and rivers. These conditions though they have their advantages, give rise to expense when it comes to the question of road making and maintenance. But again in this connection, while our neighbouring territories with their flat countries can afford to take matters easily as regards road making, the conditions as regards Natal are all the reverse.

I have shown how favourably the cost of our road work, both "construction" and "maintenance," compares with similar work in other countries, and that this being so Natal's policy should be to steadily harden and improve her roads while those conditions exist. They will not last for ever.

A circular for teachers, containing information in connection with school gardens, has been recently issued by the Superintendent of School Gardens in Ceylon. This information includes particulars of the objects of school gardens, which may prove of interest to some of our readers. The objects of school gardens are stated to be:—(1) To brighten the surroundings of the school, and make it what it ought to be, namely, a pleasant resort for the boys and not a bare and unattractive building; (2) to lighten the routine of class work by varying it with outdoor work of a recreative nature; (3) to exemplify order, form, neatness and good taste in the laying out of the premises; (4) to furnish a field for nature study, *i.e.*, the study of natural objects in their natural surroundings; (5) to serve as object-lessons in horticulture, *i.e.*, the cultivation of useful and ornamental plants; (6) to give a practical turn to school life, and provide a training in elementary agricultural science; (7) to serve as centres for the dissemination of seeds and plants, and of information concerning them; (8) to be mediums of communication between the agencies that aim at the improvement of agriculture and the cultivating classes; (9) to induce the cultivator, directly or through the schoolboys, to take up new and improved products, and to adopt better methods of cultivation; (10) to awaken in school children a new interest in the cultivation of plants, and to instil into them a love of nature, and so reconcile them to a country life and to agricultural pursuits; (11) to encourage school children to establish gardens at their homes; (12) to make schoolboys take an honest pride in manual labour, and to induce a healthy competition among them as well as between one school and another.

The Living Bee.

By MARY RITCHIE,

*President, Natal Bee-Keepers' Association, Natal Expert, South
African Bee-Keepers' Association.*

INTRODUCTION.

"Biology for men and women is not what they teach at College, but
watching *the living bee*."

THE old naturalist theory that bees in warm countries do not store honey, having no winter to provide against, has been entirely disproved by practical bee-keepers within recent years. In America and Australia comb-honey is sold by the car-load and extracted by the ton. That similar harvests await scientific bee-keepers in South Africa is not unlikely, but so far honey must be classed as one of the "sample" products of the country. It has been proved, however, that honey can be produced in South Africa that in appearance and flavour will bear comparison with the finest "extra grade fancy" of other lands.

That there should be so few bee-keepers is not the fault of the country—a country in which one can practically live in the open air—or of its bees. Hundreds of wild swarms have their homes in the kloofs. From early spring when the bush trees blossom, through the heat of midsummer, the bees are busy, on until the autumn when the last veld flower withers and the grass is burnt and bare. The honey is stored for the most part in lonely inaccessible places in the cliffs—sometimes resulting in magnificent honey "takes" and sometimes robbed by the natives and presented for sale at the white man's "kia" a woful mixture of honey-comb, bee-brood dust and pollen. A native untaan in the honey season "all over stick" is a sight not readily forgotten. Like other small boys he likes honey; he sucks it greedily, beaming happiness, a bee stings him, he rubs the place with his sticky hands, the red mud adheres, and soon he is honey, mud and dust over head and ears.

In many places there is an abundant harvest from wild flowers alone, but everywhere, with advancing cultivation, forests and orchards are taking the place of thorn-veld and scrub. Numberless fruit trees have been planted and much of their sweetness remains ungathered every year. Through the warm spring dusk comes the perfume of the orange blossom, the sweet honey scent of the loquats, the fragrance of the mango, from thousands of blossoms brimful of sweetness, waiting for the bees.

In other countries no picture of a rural cottage is complete without

its row of skeps at front or gable end. They are suggestive of security and peace, they speak as surely as the ivy that curtains the windows or the honeysuckle that twines among the roses on the porch, of days and weeks of quiet sunshine. We feel sure the inmates as they go out and in never fail to watch the bees, and note through them the progress of the year. For by their flight they mark the first spring day, their joyous hum proclaims the apple trees in bloom, the drones loud buzzing is a very part of the indolence of summer, while the workers' eager journeyings suggest the sweetness of the honeycomb, the deliciousness of new brown bread, the scent of apples, and all the joys of harvest time.

This air of settlement and peace is lacking in the new Colonial home, and, comparatively speaking, all Colonial homes are new. There are colours only time can tone and things that only time can bring. In a new country like South Africa changes are more likely, absence and even desertion of the homestead, all may be sold at such times, even poultry disposed of, but—bees! This question of a really settled home is doubtless one of the primary reasons why bees have not received in this country the attention which they deserve, and which one might very naturally expect them to receive in this sunny land.

An old-time writer remarks that if gentle-folks only knew the pleasure to be derived from keeping pigeons no house would be without its loft. If gentle and simple folks only knew the pleasure of keeping bees no house would be without its hive.

And not only for pleasure might bees be kept but for profit also. A ready market awaits the producer of comb and extracted honey in South Africa and at higher prices than anywhere else. Eggs are scarce in this country but *honey* is scarcer.

South Africa can never be a great fruit-growing country without being a bee-keeping country as well. We are dependent upon the bees for the pollination of most of our fruit. This is easily proved. Net the branch of a fruit tree just coming into blossom that no bees may visit it, and no matter how glowing the sunshine, how plentiful the rain, how abundant the flowers, that branch will bear no fruit. Or chose a healthy strawberry plant, cover it with a fine wire-gauze meat cover and watch it from day to day; the flowers will open as usual but the strawberries will be easily counted.

Before any flower can set seed it is essential that the yellow fertilising dust or pollen should reach its stigma. This was discovered and partially understood more than two hundred years ago, but it was believed for a long time that flowers were fertilised by their own pollen. An old German botanist named Sprengel was the first to notice that the bees had anything to do with it. He watched them humming among his flowers and saw that they were interdependant—hand in glove—

with one another. He noted down what he had seen, summer after summer, and finally published a book called "The Secret of Nature Discovered." But the botanists indoors would not look at it. "What childish tales," they said, "What foolish fables." So it was soon forgotten and lay almost a century unnoticed until another naturalist took it up, and people believed when they read the "Fertilisation of Orchards," by Charles Darwin.

That stone fruits were incapable of fruiting without the bees was first popularly discovered by trying to grow peaches under glass, and again and again it has been proved that not only more but better fruit is obtained from orchards in the vicinity of bees. They are undoubtedly the most important fertilising agents: apple, pear and particularly plum trees are fruitless when deprived of the helpful work of the bees. Realising then what we owe them, it is only right that they should be housed and taken care of. The first gain would be to the bees perhaps—in saving them from the natives—but as the fruit-farmer depends upon the size of his crops, the nurseryman on the quantity and quality of his seed, he has only to understand that there would be neither fruit nor seed were it not for the bees, to realise what an important part they play—or *might play*—in the making of his income.

HOW TO BEGIN.

For the production of honey three things are essential:—1. A good honey flow, as the Americans say, plenty of honey in the flowers. 2. A strong colony of bees in an up-to-date hive. 3. Skilful management.

1. The honey-flow. South Africa to the bees is a land that floweth with milk and honey, and I have already spoken of the ungathered sweets and harvests yearly lost.

2. To buy bees used to be considered very unlucky. "I give a pig and I takes bees" is a Dorsetshire saying. In these days we are more mercenary and less superstitious. In South Africa bees may often be had for nothing, and as they frequently take up their residence where they are not wanted, bee-keepers may actually be paid for taking them away.

A strong colony means about 20,000 bees in a British hive and 50,000 in a large American one. Like the Colonial homestead the hive must grow with the growing needs of the inhabitants: as the bees multiply the capacity of the hive must be gradually increased. Vacant space makes the bees unhappy, and cramping causes them to swarm. Modern hives are designed to be easily enlarged or contracted as needed. Amongst modern hives the American Danzenbaker is one of the most suitable for the country. These and other appliances, costly enough in the past, can now be bought cheaply at Capetown, Maritzburg, or Durban. Besides the bees and hives a text-book is necessary, a smoker,

bee-veil and pair of gloves. The "A.B.C. of Bee-keeping" is excellent as a text-book and for reference, being really the last word so far on the subject; it is also the X.Y.Z. Hooper's "Bee-keeping in Jamaica" is also useful for tropical bee-keepers.

3. The bee-keeper's first task is to see that his hives are well shaded, situated, if possible, under deciduous trees. This is absolutely essential in our hot sunshine, also that they are raised from the ground and safe from ants, which annoy the bees. Hive-covers must be rain-proof not only as a protection against driving rainstorms, but if there is the slightest opening, the bees in their endeavour to shut out the light will propolis and thus dirty the sections.

The alighting boards should be kept thoroughly clean and salt sprinkled round the hives to keep down the weeds. This in the case of the Black-Jack (*Bidens Pilose*) being as much for the bee-keeper's own comfort as that of his bees.

The bee-keeper must be on friendly terms with his bees, not in fear and terror of their stings, otherwise the partnership will be unsuccessful. This friendly relationship does not come after a day or two of acquaintance or even a week or two, but its acquirement is not without a certain amount of pleasure and excitement. Though some bee-keepers work at night it is erroneous to suppose that bees do not sting in the dark. "An infant crying in the night and with no language but a cry" was to Tennyson the loneliest sound to fall on human ears. Another writer speaks of the shivering child-cry of the lamb, but the wail of bees disturbed in the darkness is, if possible, more distressing, more piteous, than any. Between 9 in the morning and 4 in the afternoon is the best time to open the hives. The bees are busy, consequently happy, and the old bees, "the stingers," are out gathering or too full to fight.

But not every day is a bee day. A wet or windy day or a day after rain should be avoided. A bee day par excellence is one that is not only warm but still, and how many long, quiet, sunny days—perfect bee-days—we have in South Africa.

II.—"THOSE BEES."

They are between the iron and the wood: either we must pull the house down or let them remain: there seems no way of getting rid of them. This is a very frequent complaint in South Africa and will be until there are more bee-keepers, or the wood and iron houses so common in this country come to be replaced by buildings of a more substantial type.

The bees, sometimes swarming naturally, sometimes driven from their homes in the ground by grass fires or native plunderers, are forced to seek other quarters. In their quest for new homes they discover a crack or crevice just under the roof of some wood and iron building and

inside a clean rainproof space, with a convenient cross-bar on which to build their comb. Little wonder that, finding such a desirable residence standing empty, they should take immediate possession. Their disillusionment begins when their new landlord looms up large through a halo of sulphur smoke with the avowed intention of making the place too hot to hold them.

As a rule this is no easy task. The bees have settled down and are loathe to face the dangers and difficulties of a second removal, while the householder is too anxious to be rid of them to pay any attention to their little ways. A battle royal ensues in which there is much loss of temper on the one side and on the other thousands slain. For personal reasons a conciliatory policy is best and the bees should be allowed to remain until some one—European or native—with sufficient knowledge or skill can be found to take them away.

There are societies for the prevention of cruelty to animals, societies for the prevention of cruelty to dogs, for the prevention of cruelty to cats, societies for the prevention of cruelty to birds, now our Bee-Keepers' Association has been formed for the prevention of cruelty to *bees*, for surely these wonderful insects deserve to be studied and treated kindly and never ruthlessly destroyed.

Ignorance alone can account for the heartless and needless cruelty so often practised. With increasing knowledge comes a more humane and scientific attitude, suggesting a wiser policy and a very different treatment; one, in short, in which man claims his promised dominion over the creatures.

It is true that according to old-fashioned methods, even where bees were "kept," the securing of the honey-crop meant the destruction of the bees, but modern appliances have revolutionised all this. Up-to-date hives are such that honey can be removed without the fear of stings or the loss of a single bee. It is not uncommon in Colonial homes to find packing-cases transformed into very creditable furniture and things innumerable made of paraffin tins. In the same way an old wine or soap box can be turned into a serviceable hive and its humble origin hid beneath a coat of paint. But in these days of harbours and light railways even this is quite unnecessary. Hives can be imported in the flat at very small cost, supers, section-boxes and all complete. If a thing is worth doing it is worth doing well.

In transferring a swarm from a home of their own choosing to one of ours, our first task is to discover the exact whereabouts of the bees. They may be some distance from the crack or crevice they are using as an entrance. But blow a little smoke between the seams and listen to the patter of innumerable feet, like the sound of falling raindrops. Go on until the uproar leaves no doubt as to their position, then with a stone or wooden mallet tap all round, and especially below the cluster.

Remove the iron as quickly and quietly as possible. The combs may be one behind the other or in one magnificent sheet, built downward for lack of lateral space. The combs revealed, a few minutes must be allowed for the bees to settle down, as the withdrawing of the bolts is sure to have disturbed them. A little smoke will cause them to unite in a tight cluster. Set the swarming box under the cluster, or at least as near as possible, and close by another box covered with a cloth to receive the comb. The more honey there is the more difficult the task will be; on the other hand the more worth doing. A light box or closely woven basket should now be held immediately under the cluster and the soft brown mass of bees brushed gently in. While an expert would secure the queen and put her in the swarming box where she would be instantly followed by the bees, the novice is safer to secure the bees *en masse*. If they are not swept off until tightly clustered the queen is sure to be amongst them.

Should there be no space alongside the combs in which the bees may cluster bees and combs must be removed together. Beginning from the outside comb, cut it off with adhering bees below the honey, which is usually along the top, moving the knife slowly so as not to bruise a bee. Shake the bees from the comb very gently into the swarming box and put the comb in the other box; do the same with the second comb and so on. If every bee is secured the queen is certain to be among them. The honeycomb should now be cut down, but in smaller pieces as it is heavy and more difficult to handle. After all the comb has been removed allow time for the flying bees to cluster, brush this cluster into the basket, and shake in front of the box as before, again making sure of every bee.

To secure the lingerers and those whose affections seem to be divided between the queen and their old home, make a little paper bag in the shape of a filler, the narrow end just wide enough to let in a bee, and insert this in the cover of the swarming box. The bees will find their way in but cannot come out again.

As soon as all the bees are in, the swarming box should be put in the shade and carried as soon as possible and as steadily as possible to the site prepared for the hive, carried by the bee-keeper and not entrusted to anyone else—not even a Kafir. No sudden movement must jar the thousands of quivering little bodies inside, which if carried carefully will cling in wondrous festoons to the cover till the time of their release.

The hive set firmly in place and provided with frames fitted with foundation the bees should be gently emptied out on a white cloth in front of the entrance. As soon as the queen enters the bees are practically hived, so that all eyes must keep a sharp lookout for her. As John Burroughs says, "It is an event to distinguish her amid the mass of

bees; it awakens a thrill. Before you have seen the queen you wonder if this or that bee which seems a little larger than its fellows is not she, but when you once really set eyes on her, you do not doubt for a moment. You *know* that is the queen, that long, elegant, shining, feminine-looking creature can be none less than royalty!"

A frame of uncapped brood may be given from another hive or a sheet from the comb-box, fitted in a frame. This will give the nurse bees employment and satisfy the queen—as mothers with babies must needs stay at home. The hive should then be left unopened for at least four days.

One's first swarms are always the most exciting—such novel situations and unexpected happenings. To transfer a stock from a building to a hive and have them all quietly settled in their new home within an hour is tame compared to those early adventures, when we made mistakes and worse remedies, when the bees behaved so differently from all the bee-books said and we paused baffled and bewildered while the hours slipped by like minutes, and we knew by the shadows it was four o'clock and all too soon it would be sunset.

Formerly, the difficulty of hiving the bees was only surmounted by the difficulty of keeping them, but since the indention of the Alley Queen and Drone Trap, that disappointment is nearly a thing of the past. Made of perforated zinc and attached to the front of the hive, it allows the bees free access out and in, but traps the queen should she seek to abscond.

It pays to keep a few buckles, straps, etc., on hand to mend the harness when needed. It will do no harm to have these things on hand even if they are not needed. It is always well to have them when they are needed. Having them may save a trip to town when there is no time to go.

The giving of salt to cows is one of the little things that is apt to be neglected, and a handful once a week is a too common practice. One of the most successful dairymen in the country feeds his cows four ounces of salt per cow per day, and says it pays. "The cow," he says, "gives more milk, the milk has a much better flavour and will keep considerably longer." The salt is fed with the grain ration.

Swine Husbandry and Bacon Production.

By LOUDON M. DOUGLAS,

Lecturer on the Meat Industry, College of Agriculture, Edinburgh.

FROM day to day the evidence continues to accumulate showing that the bacon markets of the world are hopelessly disorganised, and that in so far as swine husbandry is concerned, we are passing through a critical time. It is in fact a curious state of affairs and calls for special comment not only from all who are interested in the prosperity of agriculture, but from those also who are specially concerned with securing steady markets in the provision trade. Apparently the shortage began about the beginning of the present year, and has been more especially marked in the United Kingdom, but it exists also in the United States, Canada, and Denmark, these being the principal bacon curing countries of the world. In the United States the outlook is indeed a serious one, not only for that country itself, but for the export trade. Actual records show for example that the number of hogs packed, on what is known as the Western Markets, and which include Chicago, Kansas, South Omaha, St. Louis, Cincinnati and other towns of the number of sixteen, as also smaller towns in the same territories, exhibit a very considerable shortage as compared with last year. From 1st March to 1st September in each year the figures were as follows:—

<i>Number of Pigs Packed on Western Markets, U.S.A.</i>	
1908	12,975,000
1909	11,735,000
Shortage	1,240,000

This is only one feature of the situation which now looks very black indeed owing to the estimated shortage which is likely to occur in the corn crop. The Agricultural Department of the United States estimated early in the present year, in the month of July, that the corn or maize crop would amount to 3,300 million bushels. Since then, however, weather conditions have upset all the calculations made, and it is anticipated that the crop will not now be more than 2,600 million bushels. As hogs are fed principally on maize in the United States this means a considerable falling off in the food supply, which is bound to react on the breeding of swine. Hence it is that future deliveries of bacon and hams are being contracted for at prices far beyond anything that has been known to the present generation.

This condition of things affects us in the United Kingdom in this way: the imports of pig products for 1908 from the United States into the United Kingdom were as follows:—

	Cwt.
Fresh Pork	135,152
Salted Pork	67,438
Bacon	2,541,945
Hams	900,795
	<hr/>
	3,645,330

Since January 1st of the present year, however, there has been a steady falling off. Thus, at Liverpool and the Mersey ports, there was a decrease in the imports of boxed meats up to 30th of August last which compared as follows:—

	Boxes.
1908	511,100
1909	397,900

Shortage at Mersey ports 113,200

The imports from Denmark and Canada have also been short, and reports from both of these countries indicate that it will be impossible to increase the output for a long time to come.

Naturally, such a condition of things has affected the prices of bacon, and, as a consequence, at the moment we have phenomenal prices being realised throughout the country, and there is every indication of these going yet higher. Canadian bacon is quoted at 73s. to 76s. per cwt., Danish at 76s. to 79s., Irish at 74s. to 77s. These are wholesale prices, of course, and represent the values on the exchange for large quantities. After sales have been made on the basis of these figures, several other intermediate handlers have to secure a profit before the counter of the grocer is reached, and the consumer then buys at a retail price. But these wholesale prices are far beyond the normal: 60s. per cwt. would be a fair average price for home bacon, now there is some talk of prices exceeding 80s. and even going up to 90s. per cwt. As has been said, it is a curious situation, and is the result of a continuation of circumstances such as has never happened before. For years back the average import of pig products has been fairly steady, as will be seen from the official figures following, and which show the imports of bacon, hams, and lard for the last three years.

	Cwt.	£
Bacon: 1906	5,413,056	14,306,290
1907	5,250,955	14,533,985
1908	5,604,772	14,249,263
Hams: 1906	1,269,942	3,364,596
1907	1,097,397	3,098,028
1908	1,184,337	2,937,983

	Cwt.	£
Lard (excluding imitation lard):		
1906 ..	1,857,088	3,959,656
1907 ..	1,800,151	4,112,058
1908 ..	1,876,656	4,151,138

These figures indicate fairly steady markets, which during the present year will be entirely altered. The shrinkage in this department of our food supply cannot be less than 20 per cent. The supply of pig products from the United States was at its highest between 1898 and 1901, and since then it has suffered a continuous decline, which has, however, been counterbalanced by supplies from Canada, Denmark and other countries. The average quantity has been about the same.

Naturally, under such circumstances, we turn to our home conditions in order to see if anything is being done to avert the coming famine, and, at the very outset, are met with the figures from the preliminary statement just issued by the Board of Agriculture, in which the numbers of live stock in the United Kingdom are given. We find that there is a lamentable shortage of pigs as compared with last year. The figures are as follows:—

Agricultural Returns up to 4th June in each Year.

	1909	1908
Sows kept for breeding purposes .. .	316,532	369,476
Other pigs	2,064,335	2,454,006
Totals	2,380,887	2,823,482

These show a decrease of 52,924 or 14·32 of breeding sows as compared the one year with the other, and a total decrease in the pig supply of Great Britain of 442,595 or 15·7 per cent. In so far as Ireland is concerned a very considerable shortage is also to be recorded here, and unfortunately one of the items is a smaller number of breeding sows by about 20,000.

It will thus be seen that we have reached a perilous condition in so far as swine husbandry and bacon curing is concerned. The demand for pig products goes on increasing from year to year, and it seems difficult to understand why farmers do not endeavour to cultivate pigs to a greater extent. Year in and out they yield a larger profit than any other live stock, inasmuch as they can be fed on food which would otherwise be wasted. It is true that at the moment feeding meal is dear, but even at the present price of about 9s. per cwt. there is a handsome profit in pig feeding. In ordinary times there is a good profit with pigs fetching 42s. per cwt. dead weight. Such a figure pays the farmer and pays the bacon curer. At the moment, however, the dead weight of pigs is about sixpence per lb., and in some markets rather more.

Now, surely, is the opportunity for the British farmer. Many countries are looking to the United Kingdom as an outlet for the product from new bacon and pig product establishments now being constructed. Some of these are as far away as China! Only recently a cargo of frozen Chinese pork was brought to London and has been absorbed without any trouble. Now it is proposed to cure the pig on the spot in that country and ship the product to the United Kingdom in the finished state. In Russia, again, new bacon factories are being constructed, as also in France and in some other European States; all with a view to supply the British market. Why should not the farmers of the United Kingdom try to do some of this supplying themselves?

We send away upwards of £20,000,000 per annum to foreign countries for pig products, and much of it could, with a little organisation, be retained at home. It will be remembered that, about 1887, the farmers of Denmark were without warning prohibited from sending their live swine into Germany, and they at once formed themselves into co-operative societies with the object of fostering swine husbandry and erecting bacon factories. They knew that the British farmers were not taking advantage of their opportunities, and that there was plenty of demand for bacon in England. The latest available Consular report tells the remainder of the story. It says:—

The first co-operative slaughter-house was founded in 1887 in Jutland (Denmark); in 1897 there were 21 co-operative slaughter-houses with a membership of 42,000; in 1900, 26 slaughter-houses and 60,000 membs; in 1905, 32 slaughter-houses and 70,000 members; and in 1908, 33 slaughter-houses and 101,456 members.

During 1908 the Danish co-operative slaughter-houses accounted for 1,549,550 pigs, against 1,311,241 pigs in 1907, besides 16,004 cattle and 14,344 calves.

Other slaughter-houses in Denmark slaughtered about 500,000 pigs, thus bringing the total number slaughtered in the country up to over 2,000,000.

So much for organisation and taking advantage of opportunity. Most of the bacon referred to in these figures was sold and eaten in the United Kingdom.

This is therefore primarily a question for farmers and farmers' societies. There are many areas in the United Kingdom where bacon factories would undoubtedly flourish because of their proximity to pig growing districts and also because of the facilities for conveying produce to large towns. In cheese making and dairying districts this is especially so as the bye-products of the dairy, in the shape of whey or separated milk, are amongst the best feeding stuffs in a pig feeding ration.

Natal's Progress in 1908.

By H. J. CHOLÉS, F.S.S.

(Continued from Page 464.)

VI.—OUR TRADE IN FARM PRODUCTS.

We may now proceed to examine the production, imports, exports, and consumption of various products in which the Natal farmer is directly or indirectly interested. Most of the figures given in the statements that follow, in this section, are taken from the Annual Bluebook of the S.A. Customs Statistical Bureau.

(1) OUR FRESH MEAT SUPPLY.

The following statement reflects the trade in imported and South African beef, mutton and pork. It is interesting to notice that the imports from overseas are still on the decrease, having fallen from 40 million pounds in 1907 to 17 millions in 1908—a very gratifying decrease. Much of this meat, of course, goes to the Transvaal and elsewhere, but a quantity is also consumed in this Colony, and in the figures relative to the consumption of imported meat we find a drop from three to one and a half millions, which, indeed, is something worth pondering over. Our exports of Natal beef to the Transvaal show an increase of some six million pounds, due of course, chiefly to East Coast Fever.

				1907	1908
				lbs.	lbs.
<i>Imports—</i>					
Oversea—					
Beef and Veal	..			27,943,746	10,242,861
Mutton and Lamb	...	...		11,690,228	6,809,579
Pork	...	...	...	423,514	7,869
Total Oversea				40,057,488	17,060,309
South Africa—					
Beef and Veal	...	...		6,653	13,657
Mutton and Lamb	...	...		9,596	1,424
Pork	...	...	...	517	1,245
Total South Africa				16,766	16,326
Total Imports				40,074,254	17,076,635

				1907	1908
				lbs.	lbs.
<i>Exports (Not S.A.P.)—</i>					
By Sea—					
Beef and Veal	...	...		370,361	272,875
Mutton and Lamb	...	...		164,432	156,628
Pork	...	...		6,294	1,499
Cape Colony—					
Beef and Veal	...	...		45,180	342,555
Mutton and Lamb	...	...		22,144	25,574
Pork	...	...		3,416	—
Orange River Colony—					
Beef and Veal	...	...		666,680	177,049
Mutton and Lamb	...	...		268,573	80,098
Pork	...	...		2,255	47
Transvaal—					
Beef and Veal	...	...		23,656,124	10,382,818
Mutton and Lamb	...	...		9,533,094	4,641,066
Pork	...	...		402,941	31,090
				<u>35,141,503</u>	<u>16,111,308</u>
<i>Exports (S.A.P.)—</i>					
By Sea—					
Beef and Veal	...	...		—	32,823
Mutton and Lamb	...	...		—	9,016
Pork	...	...		1,659	2,336
Cape Colony—					
Beef and Veal	...	...		47,578	43,229
Pork	...	...		31,740	2,616
Orange River Colony—					
Beef and Veal	...	...		308,736	24,111
Pork	...	...		1,202	3,852
Transvaal—					
Beef and Veal	...	...		11,181,008	17,115,495
Mutton and Lamb	...	...		23,026	9,956
Pork	...	...		81,020	55,022
				<u>11,675,969</u>	<u>17,298,456</u>
<i>Net Consumption in Natal of Imports</i>					
Beef and Veal	...	...		619,902	58,090
Mutton and Lamb	...	...		2,434,949	1,465,346
Pork	...	...		13,126	—
				<u>3,067,977</u>	<u>1,523,436</u>

Our farmers turned out, in 1908, 135,485 lbs. of pork (152,628 lbs. in 1907), and 130,636 lbs. of meat other than pork (124,105 lbs. in 1907).

STOCK IN POSSESSION OF EUROPEANS.

The following is a statement of the numbers of cattle, sheep, and pigs in possession of Europeans on the 1st August, 1906, 1907 and 1908, respectively:—

<i>Cattle :—</i>		1906	1907	1908
Bulls, imported	...	127	159	144
Bulls, Colonial	...	3,922	3,900	3,772
Cows	...	84,093	78,537	75,790
Oxen	...	66,630	62,816	59,275
Other Cattle	...	89,085	82,336	81,432
		<u>243,857</u>	<u>227,748</u>	<u>220,413</u>
<i>Sheep :—</i>				
Rams, imported	...	327	368	417
Rams, Colonial	...	7,990	10,084	11,331
Sheep, woolled	...	524,712	574,068	665,222
Kafir Sheep	...	50,126	58,037	63,423
Persian Sheep	...	16,900	18,007	24,984
		<u>600,055</u>	<u>661,466</u>	<u>765,377</u>
<i>Pigs :—</i>				
Boars, imported	...	50	52	66
Boars, Colonial	...	1,356	1,440	1,410
Sows	...	5,729	6,293	6,804
Other Pigs	...	16,242	17,137	17,397
		<u>23,377</u>	<u>24,922</u>	<u>25,677</u>

(2) DAIRY PIG AND POULTRY FARMING.

A notable feature in our trade in dairy products last year, was the increase in our exports of South African butter and cheese to the Transvaal. The exports of butter jumped from 94,000 lbs. in 1907 to 290,000 lbs. in 1908; and at the same time the imports by the Transvaal of foreign butter through Natal decreased from 3,223,00 lbs. to 2,799,000 lbs., approximately. As regards cheese, the exports of South African produce from Natal to the Transvaal, it will be seen, have increased from 5,700 lbs. to 13,600 lbs. To Cape Colony, too, our exports of cheese have increased—in this case fivefold.

This is a very gratifying state of affairs, but it is not so pleasant to contemplate the increased consumption in Natal of imported cheese—463,861 æs. last year, as compared with 386,357 lbs. in 1907. The consumption of imported butter, however, was less last year than in the previous year.

The following figures reflect the trade in these two products and condensed milk during the last two years:—

Butter.

		1907 lbs.	1908 lbs.
Produced in Natal	... ..	819,842	820,000
<i>Imports</i>	... ..	4,469,653	4,131,788
<i>Exports (Not S.A.P.)—</i>			
By Sea	... ..	26,135	32,346
Cape Colony	... ..	83,834	28,453
Orange River Colony	... ..	112,364	118,159
Transvaal	... ..	3,223,097	2,799,521
Southern Rhodesia	... ..	—	206
Basutoland	... ..	152	—
Swaziland	... ..	—	212
		3,445,582	2,978,897
<i>Exports (S.A.P.)—</i>			
By Sea	... ..	308	—
Cape Colony	... ..	125	542
Orange River Colony	... ..	716	3,383
Transvaal	... ..	94,472	290,060
Southern Rhodesia	... ..	50	1,300
Basutoland	... ..	116	25
		95,787	295,310
<i>Net Consumption in Natal of Imports</i>		1,073,486	845,023

Cheese.

		1907 lbs.	1908 lbs.
Produced in Natal	... ..	39,868	40,000
<i>Imports—</i>			
By Sea	... ..	1,557,141	1,593,317
South Africa	... ..	82,322	112,101
		1,639,463	1,705,418
<i>Exports (Not S.A.P.)—</i>			
By Sea	... ..	10,195	5,853
Cape Colony	... ..	12,431	5,787
Orange River Colony	... ..	97,676	81,688
Transvaal	... ..	1,068,615	1,044,914
Southern Rhodesia	... ..	154	1,705
Basutoland	... ..	129	483
Swaziland	... ..	—	692
		1,189,200	1,141,122

	1907 lbs.	1908 lbs.
<i>Exports (S.A.P.)—</i>		
By Sea	241	454
Cape Colony	3,722	19,179
Orange River Colony	1,481	2,044
Transvaal	5,728	13,639
Southern Rhodesia	—	966
Swaziland	—	39
	<hr/> 11,172	<hr/> 36,321
<i>Net Consumption in Natal of Imports</i>	<hr/> 386,357	<hr/> 423,861

Condensed Milk.

	1907 lbs.	1908 lbs.
<i>Imports</i>	<hr/> 4,890,715	<hr/> 4,378,611
<i>Exports (Not S.A.P.)—</i>		
By Sea	15,927	—
Cape Colony	31,551	28,294
Orange River Colony	201,704	121,973
Transvaal	1,794,280	1,166,191
Southern Rhodesia	4,935	3,709
Basutoland and Bechuanaland	1,524	1,473
Swaziland	—	2,059
	<hr/> 2,049,921	<hr/> 1,323,699
<i>Net Consumption of Imports in Natal</i>	<hr/> 1,914,848	<hr/> 2,851,985

There is nothing particular to note with regard to the trade in bacon and hams and lard, except that, whilst we are exporting less in the way of bacon and hams, we are producing more for our own consumption and consuming less of the imported article, which is satisfactory enough. The same, however, cannot be said with regard to lard, for although we appear to be producing more locally, we are at the same time consuming more imported lard. The situation with regard to these products will be understood from a study of these figures:—

Bacon and Hams.

	1907 No.	1908 No.
Pigs owned by Europeans in Natal...	<hr/> 24,922	<hr/> 25,677
	lbs.	lbs.
Bacon and Hams produced in Natal	<hr/> 883,866	<hr/> 900,000
<i>Imports</i>	<hr/> 2,466,989	<hr/> 2,325,833

Bacon and Hams.—(Continued).

				1907	1908
				lbs.	lbs.
<i>Exports (Not S.A.P.)—</i>					
By Sea	...	...	...	3,940	2,782
Cape Colony	...	...	...	10,510	18,335
Orange River Colony	...	...	...	74,468	59,461
Transvaal	...	...	...	1,690,208	1,529,592
Southern Rhodesia	...	...	...	896	44
Basutoland	...	...	...	264	844
Swaziland	...	...	...	—	1,402
				<hr/>	<hr/>
				1,780,286	1,612,460
				<hr/>	<hr/>
<i>Exports (S.A.P.)—</i>					
By Sea	...	...	...	—	10
Cape Colony	...	...	...	1,552	20
Orange River Colony	...	...	...	9,897	8,784
Transvaal	...	...	...	20,944	5,386
Basutoland	...	...	...	189	407
				<hr/>	<hr/>
				32,582	14,607
				<hr/>	<hr/>
<i>Net Consumption of Imports in Natal</i>				<hr/>	<hr/>
				721,370	682,451
				<hr/>	<hr/>

Lard.

				1907	1908
				lbs.	lbs.
<i>Produced in Natal—</i>					
Produced in Natal	...	...	...	47,616	56,289
				<hr/>	<hr/>
<i>Imports</i>				<hr/>	<hr/>
				759,768	501,443
				<hr/>	<hr/>
<i>Exports (Not S.A.P.)—</i>					
By Sea	...	...	...	2,368	2,904
Cape Colony	...	...	...	21,167	3,816
Orange River Colony	...	...	...	16,596	10,322
Transvaal	...	...	...	498,358	297,868
Southern Rhodesia	...	...	...	900	606
Basutoland	...	...	...	—	2
Swaziland	...	...	...	—	4,782
				<hr/>	<hr/>
				539,389	320,300
				<hr/>	<hr/>
<i>Exports (S.A.P.)—</i>					
Cape Colony	...	...	...	380	100
Orange River Colony	...	...	...	—	50
Transvaal	...	...	...	100	158
				<hr/>	<hr/>
				480	308
				<hr/>	<hr/>
<i>Net Consumption of Imports in Natal</i>				<hr/>	<hr/>
				174,278	100,716
				<hr/>	<hr/>

An idea as to the trade in eggs and poultry is afforded by the following statements:—

Eggs.

		1907 No.	1908 No.
Sold by Europeans in Natal	...	6,317,160	5,664,120
<i>Imports</i>	... ..	1,848,396	1,503,628
<i>Exports (Not S.A.P.) —</i>			
Orange River Colony	...	19,524	10,560
Transvaal	...	749,322	810,594
Southern Rhodesia	...	2,520	—
		771,366	821,154
<i>Exports (S.A.P.)—</i>			
Cape Colony	...	144	1,644
Orange River Colony	...	7,512	12,816
Transvaal	...	493,620	661,584
Southern Rhodesia	...	—	360
		501,276	676,404
<i>Net Consumption of Imports in Natal</i>		1,043,834	603,632

Poultry.

		1907 No.	1908 No.
Fowls, Ducks and Geese owned by Europeans in Natal	...	278,850	354,405
		lbs	lbs.
Imports of Frozen Poultry	...	869,456	332,716
<i>Net Consumption in Natal of Imports</i>		62,140	10,026

(3) WOOL AND HAIR.

Our production and exports of wool and mohair are still on the increase, as is shown in the following statements. The total exports of mohair were less last year than in 1907, but the exports by sea (which are more important) were greater. For both products the figures show a satisfactory state of affairs.

Wool.

		1907 lbs.	1908 lbs.
Produced in Natal	... ..	1,979,999	2,160,905

Wool.—(Continued).

				1907	1908
				lbs.	lbs.
<i>Imports—</i>					
Cape Colony	...	...	...	1,728,110	1,329,013
Orange River Colony	...	...	...	8,160,679	9,761,093
Transvaal	...	...	...	6,693,255	7,827,181
Basutoland	...	...	...	571,809	482,147
Bechuanaland	...	...	...	—	360
				<hr/>	<hr/>
				17,153,853	19,399,794
				<hr/>	<hr/>
<i>Exports (S.A.P.)—</i>					
By Sea	...	...	...	20,264,098	24,117,180
Orange River Colony	...	...	...	5,066	300
Transvaal	...	...	...	2,778	4,914
				<hr/>	<hr/>
				20,271,942	24,122,394
				<hr/>	<hr/>

Mohair.

				1907	1908
				No.	No.
Angora Goats in possession of Europeans				87,436	18,349
				<hr/>	<hr/>
				lbs.	lbs.
Mohair produced in Natal				207,628	219,825
				<hr/>	<hr/>
<i>Imports—</i>					
Cape Colony	...	...	...	14,146	11,497
Orange River Colony	...	...	...	672,427	472,545
Transvaal	...	...	...	234,162	174,767
Basutoland	...	...	...	141,984	23,968
				<hr/>	<hr/>
				1,062,719	682,777
				<hr/>	<hr/>
<i>Exports (S.A.P.)—</i>					
By Sea	...	...	...	1,125,957	1,319,636
Cape Colony	...	...	...	8,021	—
				<hr/>	<hr/>
				1,133,978	1,319,636
				<hr/>	<hr/>

(4) THE FRUIT INDUSTRY.

An examination of the figures regarding the production, exports and imports of fresh fruit, shows unmistakable indications of progress. There is a noteworthy increase, for example, in the quantities of fresh fruit sold by European growers—from £37,957 in value in 1907 to £52,627 last year. Still greater, proportionately, is the decrease in the consumption of imported fruit: in 1907, we consumed £24,425 worth of fruit grown outside the borders of Natal, while last year we spent £9,456 only. This improved state of things serves as a counterbalance

to the shrinkage in exports of Natal fruit which the Customs figures indicate. The general position is reflected in the following statement:—

Fruit.

	1907 £	1908 £
Fruit sold in Natal by Europeans ...	37,957	52,627
Fruit sold in Natal by Indians ...	17,000	18,000*
Fruit canned and preserved ...	2,642	2 099
	<hr/> 57,599	<hr/> 72,726

* Estimated.

Imports—

By Sea ...	30,398	12,971
South Africa ...	6,692	4,311
	<hr/> 37,090	<hr/> 17,282

Exports (Not S.A.P.)—

By Sea ...	388	143
Cape Colony ...	342	247
Orange River Colony ...	758	477
Transvaal ...	4,779	2,757
Southern Rhodesia ...	—	3
Basutoland ...	9	2
	<hr/> 6,276	<hr/> 3,629

Exports (S.A.P.)—

By Sea ...	2,739	2,112
Cape Colony ...	28,393	29,475
Orange River Colony ...	11,290	10,644
Transvaal ...	73,526	55,722
Southern Rhodesia ...	290	752
Basutoland ...	66	82
Bechuanaland ...	—	1
	<hr/> 116,304	<hr/> 98,788

Net Consumption in Natal of Imports

24,425	9,456
--------	-------

The figures at my disposal do not enable me to form an estimate of the value of jams and jellies produced in Natal in 1908 sufficiently approximate to permit of a just comparison with the 1907 production. Roughly, the production is probably in the vicinity of £9,000 in value. An idea of the trade in jams and jellies, both of South African and of foreign manufacture, will be obtained by a study of the following figures:—

Jams and Jellies.

				1907	1908
				lbs.	lbs.
<i>Imports—</i>					
By Sea ...	...	...	...	890 093	683,268
South Africa ...	...	...	...	110 287	137,136
				<hr/>	<hr/>
				1,000,380	820,404
				<hr/>	<hr/>
<i>Exports (Not S.A.P.)—</i>					
By Sea ...	...	...	...	10,483	5 965
Cape Colony ...	...	...	...	15,409	10,274
Orange River Colony ...	...	...	...	52,404	36 416
Transvaal ...	...	...	...	715 842	466 098
Southern Rhodesia ...	...	...	...	2 646	5 743
Basutoland ...	...	...	...	144	444
Swaziland ...	...	...	...	—	912
				<hr/>	<hr/>
				796,928	525,852
				<hr/>	<hr/>
<i>Exports (S.A.P.)—</i>					
By Sea ...	...	...	...	21,530	12,184
Cape Colony ...	...	...	...	149,785	88,345
Orange River Colony ...	...	...	...	46,431	53,474
Transvaal ...	...	...	...	335,738	310,205
Southern Rhodesia ...	...	...	...	369	9,039
Basutoland ...	...	...	...	144	1,152
Swaziland ...	...	...	...	—	654
				<hr/>	<hr/>
				555,017	475,056
				<hr/>	<hr/>
<i>Net Consumption of Imports in Natal</i>				256,887*	268,604*
				<hr/>	<hr/>

* These figures include consumption of Marmalade.

(5) GRAIN AND PULSE.

The following statements reflect the trade, in 1908 as compared with 1907, in barley (grain), oats (grain), maize and maize products, Kafir corn, rice, wheat, and beans and peas:—

Barley (Grain).

				1907	1908
				lbs.	lbs.
Produced in Natal .	...	...	...	345,800	446,200
				<hr/>	<hr/>
<i>Imports—</i>					
By Sea ...	...	...	...	3,178	5,561
South Africa ...	...	...	...	301,598	174,621
				<hr/>	<hr/>
				304,776	180,182
				<hr/>	<hr/>

Barley (Grain).—(Continued).

				1907	1908
				lbs.	lbs.
<i>Exports (Not S.A.P.)—</i>					
By Sea	...	...	...	122	—
Cape Colony	...	...	...	2,830	50
Orange River Colony	...	...	...	1,706	300
Transvaal	...	...	...	3,881	3,742
				8,529	4,092
<i>Exports (S.A.P.)—</i>					
By Sea	...	...	...	5,253	14,384
Cape Colony	...	...	...	18,807	785
Orange River Colony	...	...	...	1,491	1,101
Transvaal	...	...	...	3,291	4,545
Southern Rhodesia	...	...	...	400	300
				29,239	21,115
<i>Net Consumption in Natal of Imports</i>				—	3,725

Oats (Grain).

				1907	1908
				lbs.	lbs.
Produced in Natal				286,200	357,480
<i>Imports—</i>					
By Sea	...	...	...	912,416	451,154
South Africa	...	...	...	761,806	2,799,470
				1,674,222	3,250,624
<i>Exports (Not S.A.P.)—</i>					
By Sea	...	...	...	7,826	1,351
Cape Colony	...	...	...	89,969	62,304
Orange River Colony	...	...	...	17,371	1,142
Transvaal	...	...	...	388,148	114,083
Southern Rhodesia	...	...	...	22,914	487
				526,228	179,367
<i>Exports (S.A.P.)—</i>					
By Sea	...	...	...	408	1,356,287
Cape Colony	...	...	...	8,388	17,062
Orange River Colony	...	...	...	5,294	13,753
Transvaal	...	...	...	76,228	103,957
Southern Rhodesia	...	...	...	5,456	8,250
				95,774	1,498,410
<i>Net Consumption of Imports in Natal</i>				827,022	231,649

Maize, Maize Meal, and Samp.

	1907 lbs.	1908 lbs.
Maize produced in Natal by Europeans	111,086,400	132,854,000
<i>Imports—</i>		
By Sea	213,347	235,820
South Africa	41,610,470	45,183,103
	41,823,817	45,195,073
<i>Exports (Not S.A.P.)—</i>		
Orange River Colony	540	—
Transvaal	7,014	2,036
Swaziland	—	3
	7,554	2,039
<i>Exports (S.A.P.)—</i>		
By Sea	86,019,974	73,368,537
Cape Colony	21,950,853	45,651,338
Orange River Colony	650,659	265,145
Transvaal	11,370,636	3,324,597
Southern Rhodesia	1,615	40,390
Bechuanaland	13,690	1,000
	120,007,427	122,651,007

Kafir Corn.

	1907 lbs.	1908 lbs.
Produced in Natal by Europeans	5,684,800	5,356,400
<i>Imports—</i>		
By Sea	—	301,772
Cape Colony	305,596	3,127,575
	305,596	3,429,347
<i>Exports (S.A.P.)—</i>		
By Sea	7,500	58,020
Cape Colony	175,236	300,420
Orange River Colony	59,694	5,523
Transvaal	2,209,444	181,471
Southern Rhodesia	202	—
	2,452,074	545,414

Rice.

	1907 lbs.	1908 lbs.
<i>Imports</i>	42,115,096	38,470,781
<i>Exports—</i>		
By Sea	499,403	270,706
Cape Colony	397,612	172,095
Orange River Colony	475,306	570,967
Transvaal	8,991,779	4,642,280
Southern Rhodesia	10,752	16,572
Basutoland	6,957	13,448
Bechuanaland	—	164
Swaziland	—	7,673
	10,381,209	5,693,905

Wheat and Flour.

	1907 lbs.	1908 lbs.
Wheat produced in Natal	211,600	218,600
<i>Exports (S.A.P.)—</i>		
Wheat—		
Oversea	—	40
Cape Colony	560	51,618
Orange River Colony	1,949	18,061
Transvaal	16,251	4,328
	18,760	74,047
Flour—		
By Sea	—	53,975
Cape Colony	500	10,806
Orange River Colony	4,670	248,752
Transvaal	20,318	170,844
Basutoland	—	100
Southern Rhodesia	—	2,610
	25,488	487,077

Beans and Peas.

	1907 lbs.	1908 lbs.
Produced in Natal	1,087,600	1,481,000
<i>Imports—</i>		
By Sea	502,313	585,779
South Africa	13,675	41,206
	515,988	627,035

Beans and Peas.—(Continued).

				1907	1908
				lbs.	lbs.
<i>Exports (Not S.A.P.)—</i>					
By Sea	...	...	...	4,586	77,044
Cape Colony	...	...	...	12,971	1,879
Orange River Colony	...	...	...	14,314	23,093
Transvaal	...	...	...	263,251	337,301
Southern Rhodesia	...	...	...	—	100
Basutoland	...	...	...	—	17
				295,122	439,434
<i>Exports (S.A.P.)—</i>					
By Sea	...	...	...	383	65,985
Cape Colony	...	...	...	29,950	261,413
Orange River Colony	...	...	...	345	4,099
Transvaal	...	...	...	242,719	122,246
Southern Rhodesia	...	...	...	800	830
Swaziland	...	...	...	—	200
				274,197	454,773
<i>Net Consumption of Imports in Natal</i>				216,916	197,551

(6) FODDER AND FORAGE.

The provision of special fodder for stock, whether for winter or otherwise, is always a sign of progress in economic farming, and in Natal it is a matter of very considerable importance, especially since East Coast Fever has been ravaging our herds. Taking the forage crops, barley, millet, oats, sugar cane, and lucerne, etc., as well as exotic grasses, we find the following gratifying increases in the areas under these crops:—

	1907 acres.	1908 acres.	Increase.	
			acres.	per cent.
Barley	2,258	2,568	310	13·8
Millet	2,178	2,481	303	14·0
Oats	5,768	6,768	1,040	18·2
Sugar Cane (for fodder)	1,276	1,439	183	14·4
Lucerne	637	1,041	404	63·5
Other Green Crops	1,382	1,624	242	17·6
	13,459	15,941	2,482	18·4

We thus have an increase of 2,482 acres, equivalent to a little over 18 per cent., in the area under green fodder crops—an increase that is by no means to be despised. Studying the crops individually, we find a very large increase—63½ per cent.—in the area under lucerne, whilst there is a noteworthy increase of 18 per cent. in the area under oats.

The percentage of the increases, which I have shown at the right of the statement above, affords a very good indication of the direction in which farmers are inclined to turn their energies; and we find that,

whilst oats are grown to the largest extent, and barley and millet also over considerable areas nevertheless greatest interest is being displayed in lucerne. Oats, however, come next, and bid fair to hold their own among the cereals grown for fodder.

The production of these fodder crops has, in the aggregate, jumped from 19,730 tons in 1907 to 23,635 tons in 1908, an increase of nearly 20 per cent.—19·7 per cent., to be more exact—which corresponds very well with the increase in the total area recorded above.

In the figures afforded by the Customs Bluebooks on the subject of consumption of imported foodstuffs we have further matter for congratulation, for we find that last year we used 478,206 lbs. only of imported fodder and forage as compared with 3,016,746 lbs. the year before—a drop of 84 per cent.!

The following figures will be found of interest:—

Fodder and Forage.

			1907 lbs.	1908 lbs.
Produced in Natal	...	...	44,195,200	52,942,400
<i>Imports—</i>				
By Sea	...	...	12,764,800	2,973,635
South Africa	...	..	4,206,212	4,944,226
			16,971,012	7,917,861
<i>Exports (Not S.A.P.)—</i>				
By Sea	...	...	139,052	5,525
Cape Colony	...	...	47,736	5,745
Orange River Colony	...	...	178,545	2,876
Transvaal	...	...	143,288	37,052
Southern Rhodesia	...	...	37,522	11,219
			546,143	62,417
<i>Exports (S.A.P.)—</i>				
By Sea	...	...	1,817,239	5,323,642
Cape Colony	...	...	476,945	197,438
Orange River Colony	...	...	339,418	509,451
Transvaal	...	...	2,766,969	2,043,623
Southern Rhodesia	...	...	28,960	36,002
Basutoland	...	...	4,000	—
Swaziland	...	...	—	520
			5,433,531	8,110,676
<i>Net Consumption of Imports in Natal</i>			3,016,746	478,206

(7) VEGETABLES.

The following statements show the direction and volume of trade in potatoes, onions, and other vegetables. As will be seen, our exports of potatoes have evidently increased in greater proportion than our production, and as a result we have had to import more for local consumption. Onions show not only an increased consumption of imports, but also a smaller production and smaller exports of South African produce:—

<i>Potatoes</i>				1907	1908
				lbs.	lbs.
Produced in Natal	...	...	...	21,511,950	22,865,250
<i>Imports—</i>					
By Sea	...	...	...	1,873,468	2,748,550
South Africa	...	...	...	496,362	533,495
				2,369,830	3,282,045
<i>Exports (Not S.A.P.)—</i>					
By Sea	...	...	...	14,445	158,121
Cape Colony	...	...	...	22,922	29,871
Orange River Colony	...	...	...	306,994	206,103
Transvaal	...	...	...	804,359	512,854
Southern Rhodesia	...	...	...	—	1,840
Bechuanaland	...	...	...	—	400
Swaziland	...	...	...	—	182
				1,148,720	999,371
<i>Exports (S.A.P.)—</i>					
By Sea	...	...	...	22,774	84,800
Cape Colony	...	...	...	230,803	1,164,721
Orange River Colony	...	...	...	159,586	332,612
Transvaal	...	...	...	7,989,722	10,694,920
Southern Rhodesian	...	...	...	—	15,100
Basutoland	...	...	...	450	580
				8,403,335	12,292,733
<i>Net Consumption of Imports in Natal</i>				553,997	1,922,244

<i>Onions.</i>				1907	1908
				lbs.	lbs.
Produced in Natal	...	...	...	961,350	783,750
<i>Imports—</i>					
By Sea	...	...	...	732,499	806,383
South Africa	...	...	...	998,203	714,944
				1,730,702	1,521,327

Onions.—(Continued).

			1907	1908
<i>Exports (Not S.A.P.)—</i>			lbs.	lbs.
By Sea	...	...	4,934	17,382
Cape Colony	...	...	11,657	9,578
Orange River Colony	...	...	25,238	18,862
Transvaal	...	...	60,878	68,679
Southern Rhodesia	...	...	—	10
Basutoland	...	...	258	675
Swaziland	...	...	—	25
			102,965	115,211
<i>Exports (S.A.P.)—</i>				
By Sea	...	...	150	1,650
Cape Colony	...	...	6,070	7,071
Orange River Colony	...	...	33,709	23,954
Transvaal	...	...	54,631	51,235
Southern Rhodesia	...	...	1,183	548
Basutoland	...	...	250	60
Swaziland	...	...	—	282
			95,933	84,803
<i>Net Consumption of Imports in Natal</i>			65,486	712,917

Vegetables (Fresh).

			1907	1908
<i>Produced in Natal—</i>			£	£
By Europeans	...	...	2,706	3,019
By Indians	...	...	4,421	5,000
			7,127	8,019
<i>Exports (S.A.P.)—</i>				
By Sea	...	...	38	11
Cape Colony	...	...	860	815
Orange River Colony	...	...	2,877	2,598
Transvaal	...	...	8,799	4,712
Basutoland	...	...	18	13
			12,592	8,149

* Estimated.

(8) SPECIAL CROPS.

Under this heading I propose to deal with sugar, tea, tobacco, and wattle bark, four industries which though connected with the land, involve more or less of a technical knowledge and thus come rather outside the ordinary farmer's sphere.

Some interesting changes in our trade in these products are revealed by the figures in the statements that follow. We find, for instance, gratifying increases in the production of three of these crops—to the extent of 32 per cent. in the case of sugar, ten per cent. in the

case of tea, and nearly 21 per cent. in the case of wattle bark. Tobacco certainly only shows an increase of one per cent., but no large increase was to be looked for in view of the desultory way in which the industry is being carried on at the present time. Again, we find that the consumption of imported sugar has fallen by three million pounds—a drop equivalent to 32 per cent. This fall, however, refers only to sugar: of imported molasses and treacle, and golden syrup, we consumed a little more last year than in 1907. Not only did we consume 32 per cent. less of imported sugar, but we also exported 50 per cent. more of our sugar and sugar products. The figures regarding exports are especially worthy of study, as they show some large increases. Tea shows a slight increase in the consumption of the imported product, and the exports of Natal tea were less last year than in the year previous.

The following statements show the direction of trade in these products during the two years under review:—

Sugar and Sugar Products.

				1907	1908
				lbs.	lbs.
Produced in Natal—					
Sugar	...	...	...	54,260,000	71,664,000
Molasses	...	...	...	3,245,820	3,835,000
				<u>57,505,820</u>	<u>75,499,000</u>
<i>Imports—</i>					
Sugar	...	...	...	12,777,655	7,569,534
Molasses and Treacle	...	...	...	9,238	14,162
Golden Syrup	...	...	...	1,252,598	1,210,286
				<u>14,039,491</u>	<u>8,793,982</u>
<i>Exports (Not S.A.P.)—</i>					
By Sea—					
Sugar	...	...	...	87,304	54,265
Sugar Products	...	...	...	28	510
Cape Colony—					
Sugar	...	...	...	468,210	194,492
Sugar Products	...	...	...	15,855	5,951
Orange River Colony—					
Sugar	...	...	...	1,187,788	301,144
Sugar Products	...	...	...	80,251	82,499
Transvaal—					
Sugar	...	...	...	2,312,567	696,066
Sugar Products	...	...	...	955,813	929,271
Southern Rhodesia—					
Sugar	...	...	...	24,753	162,871
Sugar Products	...	...	...	—	16
Basutoland—					
Sugar	...	...	...	11,821	1,210
Sugar Products	...	...	...	560	142
Swaziland—					
Sugar	...	...	...	—	382
Sugar Products	...	...	...	—	136
				<u>5,144,950</u>	<u>2,428,955</u>

*Sugar and Sugar Products.—(Continued). **

<i>Exports (S.A.P.)—</i>				1907 lbs.	1908 lbs.
<i>By Sea—</i>					
Sugar	...	...	...	31,239	588,251
Molasses, etc.	...	...	...	21,133	2,160,726
Golden Syrup	...	...	...	—	19,544
<i>Cape Colony—</i>					
Sugar	...	...	...	12,831,058	17,978,215
Molasses, etc.	...	...	...	126,708	120,442
Golden Syrup	...	...	...	247,037	414,125
<i>Orange River Colony—</i>					
Sugar	...	...	...	7,231,572	11,897,016
Molasses, etc.	...	...	...	72,424	23,351
Golden Syrup	...	...	...	65,738	77,058
<i>Transvaal—</i>					
Sugar	...	...	...	31,480,085	45,614,507
Molasses, etc.	...	...	...	186,064	175,107
Golden Syrup	...	...	...	259,361	209,630
<i>Southern Rhodesia—</i>					
Sugar	...	...	...	275,535	655,661
Molasses, etc.	...	...	...	2,572	2,112
Golden Syrup	...	...	...	5,348	16,068
<i>Basutoland—</i>					
Sugar	...	...	...	378,655	403,674
Molasses, etc.	...	...	...	—	2,100
Golden Syrup	...	...	...	4,084	884
<i>Bechuanaland—</i>					
Sugar	...	...	...	255,649	291,134
Golden Syrup	...	...	...	2,968	2,900
<i>Swaziland—</i>					
Sugar	...	...	...	—	79,492
Golden Syrup	...	...	...	—	12
				<hr/>	<hr/>
				53,477,230	80,732,069
<i>Net Consumption in Natal of Imports</i>					
Sugar	...	...	...	9,044,751	6,029,013
Molasses and Treacle	...	...	...	3,886	7,112
Golden Syrup	...	...	...	223,831	233,071
				<hr/>	<hr/>
				9,272,508	6,269,196

Tea.

				1907 lbs.	1908 lbs.
Produced in Natal	...	...	...	3,965,838	3,278,464
<i>Imports—</i>					
By Sea	...	...	...	1,350,658	1,589,690
South Africa	...	...	...	3,227	11,178
				<hr/>	<hr/>
				1,353,885	1,600,868

Tea.—(Continued).

		1907	1908
		lbs.	lbs.
<i>Exports (Not S.A.P.)—</i>			
By Sea ...	...	13,236	24,725
Cape Colony ...	...	83,586	35,420
Orange River Colony ...	...	91,379	92,744
Transvaal ...	...	967,394	1,123,226
Southern Rhodesia ...	...	3,376	5,352
Basutoland ...	...	375	694
Bechuanaland ...	...	—	100
Swaziland ...	...	—	692
		<hr/>	<hr/>
		1,159,346	1,282,953
<i>Exports (S.A.P.)—</i>			
By Sea ...	...	584,299	276,558
Cape Colony ...	...	331,916	355,683
Orange River Colony ...	...	47,980	67,271
Transvaal ...	...	262,064	349,654
Southern Rhodesia ...	...	2,336	9,133
Basutoland ...	...	1,264	2,505
Bechuanaland ...	...	2,129	3,634
Swaziland ...	...	—	1,054
		<hr/>	<hr/>
		1,231,988	1,065,492
<i>Net Consumption of Imports in Natal</i>			
		<hr/>	<hr/>
		224,518	274,319

Tobacco.

		1907	1908
		lbs.	lbs.
<i>Produced by Europeans ...</i>			
		<hr/>	<hr/>
<i>Exports (S.A.P.)—</i>			
<i>By Sea—</i>			
Unmanufactured ...	...	401	5,803
Cigars ...	...	445	601
Cigarettes ...	...	2,312	173
Manufactured, N.O.D. ...	...	3,034	3,225
		<hr/>	<hr/>
		6,192	9,802
<i>Cape Colony—</i>			
Unmanufactured ...	...	246,772	168,495
Cigars ...	...	21,772	42,792
Cigarettes ...	...	4,228	7,192
Manufactured, N.O.D. ...	...	25,442	13,684
		<hr/>	<hr/>
		298,214	232,163

Tobacco.—(Continued).

				1907	1908
				lbs.	lbs.
Orange River Colony—					
Unmanufactured	...	...	...	43,033	33,442
Cigars	...	...	...	3,513	4,177
Cigarettes	...	...	...	20,679	17,355
Manufactured, N.O.D.	...	...	...	17,513	20,688
				<hr/>	<hr/>
				84,738	75,662
				<hr/>	<hr/>
Transvaal—					
Unmanufactured	...	...	...	906,486	1,123,626
Cigars	...	...	...	35,718	34,879
Cigarettes	...	...	...	13,211	7,284
Manufactured, N.O.D.	...	...	...	51,851	30,624
				<hr/>	<hr/>
				1,007,266	1,196,413
				<hr/>	<hr/>
Southern Rhodesia—					
Unmanufactured	...	...	...	3,800	500
Cigars	...	...	...	315	555
Cigarettes	...	...	...	—	7
Manufactured, N.O.D.	...	...	...	73	300
				<hr/>	<hr/>
				4,188	1,362
				<hr/>	<hr/>
Basutoland—					
Unmanufactured	...	...	...	513	136
Cigars	...	...	...	42	63
Cigarettes	...	...	...	98	220
Manufactured, N.O.D.	...	...	...	—	56
				<hr/>	<hr/>
				653	475
				<hr/>	<hr/>
Swaziland—					
Unmanufactured	...	...	...	—	4,390
Cigars	...	...	...	—	6
Cigarettes	...	...	...	—	63
Manufactured, N.O.D.	...	...	...	—	52
				<hr/>	<hr/>
				—	4,511
				<hr/>	<hr/>
Grand Total of Exports (S.A.P.)				1,401,251	1,520,381
				<hr/>	<hr/>

Wattle Bark.

		1907 lbs.	1908 lbs.
Produced in Natal	... ..	26,535,040	32,057,920
<i>Imports—</i>			
By Sea	... ..	1,564	—*
Cape Colony (E.G.)	... ..	99,163	143,579
		100,727	143,579
<i>Exports—</i>			
By Sea	... ..	53,400,026	55,075,787
Cape Colony	... ..	823,312	1,496,301
Orange River Colony	... ..	—	2,642
		54,223,338	56,574,730†

* £60 worth of bark was imported from Madagascar, and £1 worth from Portuguese East Africa: quantities not given.

† £89 worth also was exported to the Transvaal: quantity not specified.

(9) OTHER INDUSTRIES.

The trade in the products of other industries in 1908 as compared with 1907 is reflected in the following statement:—

<i>Exports (S.A.P.)—</i>	1907 £	1908 £
<i>Ale, Beer, Stout and Cider—</i>		
By Sea	325	556*
South Africa	33,727	27,583*
	34,052	28,139
<i>Biscuits, Bread and Cakes—</i>		
By Sea	72	234
South Africa	13,093	16,381
	13,165	16,615
<i>Carriages, Carts, etc.—</i>		
By Sea	4,618	2,825
South Africa	29,446	39,576
	34,064	42,401
<i>Confectionary (exclusive of Jams, Jellies and Honey)—</i>		
By Sea	44	22
South Africa	11,841	11,787
	11,885	11,809

* No South African Cider exported.

Other Industries.—(Continued).

				1907	1908
				£	£
Matches -					
By Sea	...	...	...	611	795
South Africa	...	...	...	73,275	78,401
				<hr/>	<hr/>
				73,886	79,196
				<hr/>	<hr/>
Pickles and Sauces—					
By Sea	...	...	...	34	34
South Africa	...	...	...	1,231	1,225
				<hr/>	<hr/>
				1,265	1,259
				<hr/>	<hr/>
Saddlery and Harness—					
By Sea	...	...	...	168	25
South Africa	...	...	...	953	1,447
				<hr/>	<hr/>
				1,121	1,472
				<hr/>	<hr/>
Soap, Common—					
By Sea	...	...	...	1,597	3,508
South Africa	...	...	...	48,828	56,293
				<hr/>	<hr/>
				50,425	59,803
				<hr/>	<hr/>

There are over twelve thousand traction engines built annually in the United States, aggregating about £5,000,000.

Don't put off till to-morrow that which should be done to-day. A few days' growth of the weeds will make an extra day's labour for your force.

The first hen out in the morning and the last one in at night are almost certain to be two of the best ones you have, although the one that gets into the garden every day will give either of them a close chase for first place.

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

By W. C. MITCHELL, Hon. Secretary, Cedara.

THE annual subscription to the Association is 2s. 6d. per annum, and the secretary will be pleased to hear from all bee-keepers who are not already members.

* * *

It is hoped that members will make some effort to supply these columns with a little interesting matter occasionally on any subject relating to bees. The district reports might cover a much larger area than they do at present.

DISTRICT REPORTS.

Camperdown.—Mr. Gavin reports colonies extra strong, two swarms during October, light yellow pollen being gathered from buckwheat and dark nectar from the same source. Members will be sorry to hear also that Mr. Gavin's bees developed a regular buckwheat temper and attacked the poultry yard, killing 20 fowls.

Deepdale.—Mr. Harrington reports colonies doing fairly well, nectar being gathered from bottle-brush, fruit bloom, etc., pollen from wild daisies. No swarms so far.

Cedara.—Colonies strong and some surplus already taken. One colony that came through the winter as a two-frame nucleus, being a small swarm taken from the coast, has already provided material for a four-frame nucleus, leaving a strong colony behind.

New Hanover.—Mr. Hibbert reports no surplus being gathered owing to prevailing strong winds, but colonies strong and hives full of bees. Pollen, yellow to greenish yellow, being gathered from chickweed and syringa, nectar coming from wattle, syringa and fruit bloom.

SCIENTIFIC BEE-KEEPING.

October is the beginning of a new year for the bees: for the bee-keeper it is the beginning of a new time, when he watches them not from a commercial only but from a scientific, that is, an evolutionary standpoint. He then sees them not as things isolated and apart but in their place in the scheme of things—a link in life's wonderful chain—a verse in the story—or is it a song—of the House the Sun Built.

To follow this chain back and back from the link marked bees, from these winged manifestations of life that live in the sunshine, to its very beginnings is a fascinating task; from the air to the earth, from the earth to the shore, from the shore to the depths of the sea, to the very cradle of life itself. A wonderful world this world at the bottom of the sea—known only to scientists since the days of the "Challenger" expeditions, when at depths equal to reversed Himalayas they found a world of utter calm, for storms are only on the surface, a world of utter darkness, for the light from the lumps of phosphorescence does not pierce—a world of utter cold.

The picture makes one shiver, but here in these awful depths are the earliest forms of life—the beginnings of struggle and of love. We hasten gladly from the darkness of this region to the gloom of lesser depths, from the gloom to the twilight, from the twilight to the sunlight—in short to a picture in vivid contrast—the picture of our bees playing in the sunlight.

And when next someone asks, "Why do you keep bees?" we can honestly say, "To deepen our wonder in the world, our love of beauty—and our joy in living."—H.R. _____

BEE FEVER.

By HENRY MARTIN, Dannhauser.

Do not think, dear reader, when you see the above title that I am going to inflict upon your attention a discussion on a disease affecting the inmates of the hive. So far, thank goodness, we have at least one farming asset which has not been affected by the prevailing scourge of our country—disease. Therefore the above heading applies to the bee-keeper and not the bee, as all genuine lovers of the insect know too well.

It is a generally accepted axiom that if you want to succeed in any walk of life it is necessary to put your whole heart into the accomplishment of the particular object attempted; and perhaps in nothing is this more true than in bee-keeping. An indifferent bee-keeper never can and never will make a success; and unless the beginner, when he has gained a sufficient insight into the simpler mysteries of the hive, does not have instilled into his mind a desire to go deeper into those wonderful mysteries (I can give them no more appropriate name), and a greater love of the busy little creatures he had better not make bee-keeping either a hobby or an industry.

Unfortunately with a great many, bee-keeping is looked upon only from its commercial side and if the hive does not yield a handsome return the first season, regardless of every condition, the bees are voted a failure. With the genuine bee-keeper we are pleased to think it is very different, as they are looked upon as the most hopeful beings under the sun. Now

why, we may ask, should bee-keepers be considered as having more of that particular quality than any other craft. The answer to my mind—and I think every bee lover will agree with me—is, that apart from any pecuniary benefit we derive a great deal more genuine pleasure from our bees than from any other hobby we may take up. This statement may appear a bit over-strained to the reader who has never made a study of the inmates of the hive, but the true bee lover will endorse it. To the latter every phase of bee life and instinct is of engrossing interest, from the individual bee as it passes from flower to flower in its eager quest for nectar or pollen, to the crowded hive with its thousands of inmates undergoing the various metamorphoses peculiar to their nature, or, that most singular, and to the human mind, most unexplainable, event of beedom—the swarm.

The enthusiast can always find a charm in the open hive, whether it contains only a tiny patch of brood, the first fruits of the early spring and the promise of a life and hope begun, or, the loaded supers, the fulfilment of that hope that had its birth when spring awoke. To him there is always something new, something absorbing, something more to learn. It may sometimes prove disappointing, what is there that does not? We may sometimes have mishaps, accidents will happen, when we get more stings nor sweets; but bee-keeping never becomes dull or monotonous, and we can never reach a point where we may say there is nothing more to find out.

It has been said more than once that there is no craft under the sun which draws men closer in a bond of brotherhood and mutual affinity than that of bee-keeping, and we know the term "brother bee-keeper" is in general use: and synonymous with an eager love of the craft.

This then is the meaning of the term "Bee-Fever," sometimes applied as a term of derision, but it is an asset without which no one may hope to get the greatest amount of pleasure out of the undertaking. If we look on bee-keeping only as a means of increasing our income, or adding to the luxury of our table—while it often may do both—we have missed the finer and nobler part, that of studying one of the most wonderful and fascinating of all God's creatures.

It must not be supposed that I deprecate the desire to make bee-keeping a financial success; by all means do so to the best of your power and the earnest study and intimate acquaintanceship with the insect itself will be a means to that end.

What I would say to the beginner (and just now there are a great many in the country coming under this class), is first to make yourself thoroughly conversant with the nature and instinct of the bee by an earnest study of the open hive, and on so doing not only does your success as a practical bee-keeper depend, but you will be doubly enriched by the knowledge and pleasure gained from your study.

ISLE OF WIGHT BEE DISEASE.

Extracts from an article on the subject by WALTER MALDEN, M.A., M.D., of the Pathological Laboratory, Cambridge, appearing in the *Journal of the Board of Agriculture*, February, 1909.

HISTORY OF THE DISEASE.

The disease was apparently first noticed in the south-eastern part of the Island, in the summer of 1904. During the year 1906 it spread very rapidly, and in the spring of 1907 was prevalent over nearly the whole of the Island. Early in May, 1908, it was ascertained that almost all, if not all, the affected stocks had perished, and in consequence there did not appear to be any diseased stocks left on the Island. After a short period of apparent complete absence, the disease appeared again about the middle of June, 1908. In a recent letter, dated 15th October, 1908, Mr. H. M. Cooper says that "most of the old Island strains that were left in the spring seem to have since died."

SYMPTOMS OF THE DISEASE.

The disease seems to be confined to adult bees, the brood remaining unaffected and retaining its normal appearance. The earliest sign that bee-keepers have noticed is an apparent disinclination on the part of the bees to do any work. They fly about in an apparently aimless manner and do not gather any stores. Later they gradually lose their power of flight, being often unable to fly more than a few yards without alighting. As the disease progresses, the bees can only fly a few feet from the hive, and then drop and crawl about aimlessly on the ground. They are often to be seen crawling up brass stems, or up the supports of the hive, where they remain until they fall back to the earth from sheer weakness, and soon afterwards die. Some bee-keepers assert that the abdomens of the affected bees look darker than normal, and have a greasy or shiny appearance. Others, though on the look out for this symptom, have not noticed it. A considerable proportion of the diseased bees have swollen abdomens, which they are unable to fully extend. The terminal segments droop, and are partly flexed downwards. According to some bee-keepers this is so marked that they are able to diagnose the disease by the characteristic attitude of the bees on the combs before any dead ones are found outside the hives. It has been stated that the diseased bees lose their power of stinging. It has been proved, however, that these bees can sting, but owing to their sluggish and otherwise sickly condition are disinclined to do so. The wings are often dislocated, but this is not always the case. In a badly infected stock great numbers of bees are to be seen crawling over the ground in front of the hives, frequently massed together in little clusters, while others remain on the alighting board. If the hives be opened, numbers of diseased individuals will

often be met with inside. In winter and early spring the diseased bees void their excrement on the floor, walls and alighting boards of their hives.

All observers are agreed in stating that the foragers are the first to become infected, and many have thought that robbers which enter infected hives are the first to be attacked. In hives which have been completely destroyed the last remnant of the colony is generally found grouped around the queen. The latter probably dies from want of attention and not from the disease.

MORTALITY AND INFLUENCE OF SEASON.

During May and June the stocks are frequently destroyed in from two to four weeks, and in one case at least a stock was completely destroyed in nine days. In the winter and spring months the bees die less rapidly. Infested stocks are not invariably destroyed. Occasionally the mortality in a hive suddenly ceases. In some cases a hive may nearly die out and then rapidly recover and fill up with brood, but the hive may become badly diseased later. Hybrid stock appear to be more resistant to the disease than pure home-bred stock. Most bee-keepers who have kept both kinds are agreed that the Italian hybrids are the last to succumb, sometimes surviving for several months after the others have been destroyed.

EXPERIMENTAL EVIDENCE RELATING TO THE TRANSMISSION OF THE DISEASE.

A number of direct experiments and observations seem to show that after a short period the hives and combs are not infective. For example, Mr. J. W. Cooper writes: "I have known combs from diseased hives placed in apparently healthy hives without making any difference to the bees" (two experiments). Other experiments are described, the results of which all bear out the finding of the one mentioned above. The results, however, are quite different when swarms enter infected hives *which still contain a few diseased bees*.

ANATOMICAL INVESTIGATIONS.

Mr. A. D. Imms, the only investigator who has published any account of the anatomical observations on bees affected with this disease, writes as follows:—"The disease is eminently one of the digestive system, and might be described as being an enlargement of the hind intestine. . . The colon and the adjacent parts of the rectum are enormously distended with a congested mass of material, consisting primarily of pollen grains. . . The distended colon exerts pressure on the large abdominal air-sacs of the tracheal system, and so interferes greatly with their function. The insect is therefore unable to expand them with sufficient air, which is necessary for flight, and this feature, coupled with the additional weight in the digestive canal, renders the insect incapable when badly diseased,

of flying about." He shows that the inability to fly is not caused by paralysis of the wing muscles, but states that in the last stage of the disease the bees do not seem to have strength to move their wings at all. He further states that "while the hind intestine is thus gorged with pollen, etc., the stomach and the remaining portion of the digestive canal contain very little solid matter of any description. Some amount of a dark coloured fluid is present very often in the chyle stomach, but it is not distended with it. The contents of the rectum and colon consist of pollen grains for the most part, together with a variable quantity of a bright yellow substance in amorphous masses (wax) and a large number of bacteria. There is no individual type of pollen grain common to all bees examined."

In order to ascertain whether the distended condition of the colon was peculiar to the disease, I procured a stock of healthy bees for examination at various times and under various conditions, and also made observations on healthy specimens which were sent to me from time to time. As a result of these observations, I found that the condition of the healthy bee's intestine varies greatly. In fact, all the variations in the condition of the alimentary canal met with in the diseased bees can be seen in healthy bees under various conditions.

If the bees be taken from the hive after a few days' bad weather when they have had no opportunity of leaving the hive, it is found that the colon is distended to quite the same extent as in many diseased bees. On such bees I have conducted a number of careful experiments, with the following results:—The weight of the abdomen in the healthy bee varies between 0.030 gm. and 0.073 gm., and that of the colon between 0.012 and 0.154 gm. The weight of the abdomen in diseased bees varies between 0.03 and 0.06 gm., and that of the colon between 0.009 and 0.036 gm.

The contents of the colon, when voided by the healthy bee and deposited on a dry surface, form a dry brownish mass, similar to that described as occurring on the alighting boards, etc., during the early months of the year in this disease. Bees from the same healthy stock, caught as they returned on a fine day, showed an almost empty colon. Imms seems to have almost overlooked this natural condition.

It has been shown (Cheshire, 1896, Vol. II., p. 148), that bees normally discharge the contents of their bowels when on the wing, with the air-sacs fully distended. Cheshire, in fact, goes so far as to say that they are "structurally compelled" to do so. Nevertheless, Cheshire (Vol. II., p. 524), himself later shows that bees may defæcate without actually flying, for he mentions "that, under certain conditions (*e.g.*, inadequate protection accompanied by continued low temperature), the bees being forced to the before-mentioned vigorous agitation of the abdomen and a gentle flapping of the wings, the bowel becomes loaded

beyond endurance, and the bees, too heavy or too chilled to fly, discharge themselves upon the combs, producing a condition which has been incorrectly described as disenteric."

In the winter and spring the soiling of the hives, which, as I have mentioned occurs in this disease, may be brought about in the way described by Cheshire, since it seems probable that the depleted and diseased occupants of the hive are unable to keep the temperature up to the normal.

These observations show that the distention of the colon cannot be regarded as a condition peculiar to the disease, and I think that in the later stages of the disease, it is far more probable that weakness or disinclination to fly gives rise to overloading of the bowel, than that distention of the colon produces inability to fly. Consequently, I regard the condition of the colon as a secondary effect of the disease.

The only constant difference I observed was the chyle stomach of the affected bees was apparently more easily ruptured. This difference was, however, not very marked, and could not be relied upon in diagnosing the disease.

The results of my gross anatomical investigations, instead of aiding me, greatly increased the difficulty of investigating the disease, since they showed that it was impossible to determine whether any given bee was suffering from the disease, either by clinical signs or by coarse dissection.

A somewhat lengthly and technical report on microscopical and bacteriological examinations is summed up as follows:—Histologically the chyle stomach appears to be the only organ affected, and bacteriologically plague-like bacilli were frequently encountered, in some cases apparently within the epithelial cells. These bacilli were not found either in the brood of diseased hives or the chyle stomachs of healthy bees. For these reasons I am inclined to regard these organisms as the cause of the disease. I am, however, well aware that I have not fully established their relationship to the disease, since I have not been able to demonstrate them in every case either microscopically or by culture, or to find, except in very advanced cases, and very definite lesions constantly associated with their presence. I feel that my inability to discover any means of cultivating the organism with certainty even from chyle stomachs, in which it was present in abundance as shown by microscopical preparations, constitutes the most serious difficulty in establishing its relationship to the disease. By their morphology alone, few pathogenic bacteria can be recognised, since morphologically indistinguishable, but non-pathogenic, organisms are frequently encountered. Consequently, until some satisfactory cultivation methods have been discovered the bacteriological diagnosis of this organism must in most cases remain in doubt, for organisms simulating it in morphology probably exist.

THE PATHOLOGICAL COURSE OF THE DISEASE AND MODE OF INFECTION.

If my observations are correct, the disease must be regarded as an infectious one which primarily affects the chyle stomach. Here the specific organisms multiply and bring about destruction of the lining epithelium. Judging from the condition of many of the pollen grains found in the colon, this apparently results in the food passing undigested through the chyle stomach. Either for this reason or because the constitutional effects of the disease prevent the bees from flying and voiding their excrement, the colon becomes greatly distended in the last stage of the disease. The actual cause of death is uncertain, but it is probably brought about by mal-nutrition, possibly combined with the absorption of a specific poison and of the products of decomposition in the colon, and probably aided to some extent by imperfect oxygenation of the tissues, owing to the pressure exerted by the distended colon on the abdominal air-sacs. In regard to the mode of infection and dissemination very few definite statements can be made. There is some evidence to show that foragers, and more particularly robbers of infected hives are the first to be attacked, and communicate the disease to other members of the hive. The organism probably enters by the mouth, and infection may be spread by means of the contents of the honey stomach, or in the later stages by the infected excrement. Whatever the precise means may be by which infection is carried, the adult bees are alone affected, and there is satisfactory evidence to show that after a short period of time neither the combs nor the honey are infective.

TREATMENT AND PREVENTION.

From the nature of the disease it seems scarcely likely that its progress will be arrested by drugs, and, as a matter of fact, most of the recognised medicinal methods of treatment have already been employed by practical bee-keepers without permanent success. Since remedial measures cannot be relied on, but as the infected area (the Isle of Wight) is at present small, an attempt to exterminate the disease completely seems justifiable.

The success of any machine depends largely on who is operating it.

Disease may lurk in that old well that has not been cleaned out for several years. Better attend to it.

East Coast Fever.

THE BLOEMFONTEIN CONFERENCE.

IN the House of Assembly on the 2nd November the Minister for Agriculture stated that the following resolution had been adopted by the East Coast Fever Conference held at Bloemfontein on Friday and Saturday, 29th and 30th of October:—

Proposed by Mr. Malan, seconded by General Botha, that this Conference asks the Ministers present to lay the following resolution before their respective Governments for confirmation:—

"This Conference recommends that the Natal Government be authorised to borrow a sum not exceeding £60,000 for the purpose of dealing with East Coast Fever within the Colony, operations to commence from the western border, subject to the following conditions:—

(1) The constitution of an Executive Committee to supervise the spending of this money, the committee to consist of the Minister of Agriculture of Natal and the four Chief Veterinary Surgeons. (2) The policy to be carried out by this committee to be settled by this Conference. (3) This policy to be confirmed by the Natal Parliament."

Mr. Deane moved, and Mr. Malan seconded:—That this Conference requests General Botha to urge upon His Excellency the High Commissioner: (1) The advisability that more stringent measures be taken by the Imperial Government for the eradication of East Coast Fever in Swaziland, and to adopt the policy laid down by this Conference. (2) The advisability to secure from the Imperial Government the *pro rata* contribution from Basutoland towards the £60,000 referred to in the preceding resolution, and if Basutoland contributes its Chief Veterinary Surgeon will be added to the Executive Committee.

Mr. Malan proposed:—That the Chief Veterinary Surgeon and other officers present should meet on October 29th, at 8 p.m., to draw up a policy as outlined in the resolutions adopted by the Conference; such recommendations to be submitted to a meeting of the Conference on Saturday, October 30th:—

VETERINARY REPORTS.

The following was the report of the Veterinary Surgeons:—

Your technical advisers, pursuant with your instructions, have met in committee, and beg to recommend the following scheme, outlined in accordance with the resolutions adopted by the Conference:—

Methods to be taken to cope with East Coast Fever in Natal, and more particularly in the infected areas west of the main line of railway, and in the Division of Utrecht:—(1) Guards should be placed over all

known infected centres, on which cattle shall be counted and branded with a distinctive brand. (2) All infected areas should be fenced with as little delay as possible, farm and location boundaries to be followed wherever possible and desirable. (3) If possible infected herds should be collected and isolated in a central position, where such herds are in the immediate proximity to each other. (4) The removal of meat or skins from infected areas shall not be allowed unless these have been inspected and passed by a duly authorised officer in accordance with the regulations to be laid down. (5) That a sufficient number of competent inspectors should be provided to patrol the areas being dealt with for the purpose of locating further outbreaks of the disease. (6) The Donnybrook-Esperanza Railway should be immediately fenced and guarded, continuing the fence from Esperanza to the sea. (7) All movements of cattle should be immediately prohibited within the area enclosed by the Riverside-Donnybrook, the Donnybrook-Esperanza Railway and the Cape Border. (8) That the Natal Government provide a sufficient supply of mule transport within any area in which all cattle movements are suspended, on the recommendation of the Executive Committee, and that special rates be quoted where necessary. (9) That the infected and in-contact herds in the areas in which these operations are being conducted should ultimately be disposed of in accordance with the recommendations of the Executive Committee.

INFECTED AREAS.

(10) When there is good reason for believing that all centres of infection within the area under consideration have been dealt with, arrangements should be made to modify the restrictions imposed upon movements of stock by the introduction of the permit system; provided, however, that this shall not be done without the unanimous vote of the Executive Committee. (11) Simultaneously with the adoption of the policy outlined for dealing with the disease in the area already mentioned, a special staff of inspectors should be placed in the vicinity of the other infected areas on the west of the main line of railway and in the Utrecht Division, steps at the same time being taken to repair and guard the main line fence. (12) That at least four additional veterinary officers should be added to the present Veterinary Division in order to enable them to carry out this work in an efficient manner.

Mr. Malan proposed that the Conference suggests to the Minister of Agriculture for Natal to submit this policy to his Parliament as soon as possible for confirmation.

Mr. Malan proposed that if any difference of opinion arise between the Minister of Agriculture of Natal and the Chief Veterinary Surgeon of Natal on any point in connection with the carrying out of the policy laid down by this Conference, the Minister, as chairman of the Executive

Committee, shall immediately communicate the facts to the other members of the committee through their respective Ministers.

Mr. Malan proposed that the first meeting of the Executive Committee shall take place not later than two months from the date on which this scheme may be sanctioned by the Natal Parliament.

Mr. Hime proposed that this Conference wished it to be distinctly understood that the special provision of £60,000 is not to be held to relieve the Natal Government from the expenditure of the amounts for which provision has been made in the current Estimates in connection with East Coast Fever.

Mr. Deane proposed that this Conference recommends to the Cape and the Transvaal Governments that they each send two of their veterinary surgeons for the special service in Natal, pending the appointment qualification of the four men referred to in Section 12 of the policy.

Mr. Malan proposed that copies of the minutes and resolutions passed at this Conference be sent to the Governments of all Colonies and Territories represented.

The Minister of Agriculture intimated to the House that he intended to move a resolution at a later date. In the meantime hon. members would have an opportunity of discussing the matter which had just been read.

Hodder's Water Elevator.

A NEW INVENTION.

WE have received particulars of an interesting new invention consisting of an apparatus for raising water or other fluids to any desired height without the aid of any motive power other than that developed by the fluids flowing through the apparatus. It works automatically and continuously without any attention so long as it is supplied with water or other fluids. It is altogether different from a ram and deals with large volumes of fluids.

The power operating this apparatus is compressed air, which is obtained by water flowing over an aerator, and carrying air in bubbles down a pipe to a closed cylinder which is situated at a distance below the source equal to the distance to which the water is required to be raised above the source.

The water on arriving in the cylinder gives up the air which is

compressed in the cylinder by the weight of the falling water and the weight of the water as it returns up another pipe to within four feet of the source.

The compressed air is conveyed in another pipe to one of two displacement cylinders which is filled with water, or the fluid required to be raised, and discharges the contents to the height desired.

Whilst this displacement cylinder is being discharged the other one alongside it is being filled, and as soon as the first one is emptied a valve controlling the compressed air is automatically changed over to the other displacement cylinder which has been filled, and its contents emptied whilst the first displacement cylinder is being refilled; the filling and emptying goes on continuously

These displacement cylinders can be fed from the same source as the power water or from another source. Thus where water is available it can be used to raise sewage, sludge, oil or other fluids; sea water can be used to raise fresh water

The displacement cylinders can also be used with a steam plant for raising sewage, sludge, etc., as well as raising water.

The only moving parts of this apparatus are metal valves, there being no leather or rubber to wear or get out of order.

Where water is abundant, such as in a river or the sea, immense quantities of water can be raised and the same effect produced as is obtained at the Niagara Falls and other falls for power purposes.

The capital outlay in erecting this apparatus is considerably less than the present system of steam power, there being no engine-house, engines and boilers to provide, and the working expenses are merely nominal--there being no fuel required, nor engine drivers or stokers. One man can easily superintend a very large installation.

The elevator can be used for the following purposes, viz.:—For irrigation, at a comparatively small capital outlay, and when erected and set to work will continue with slight supervision. For draining purposes, in raising sewage to different levels, in place of the large pumps now in use with the attendant engines, boilers, etc. For unwatering mines when a head of water is obtainable. For conveying oil in pipe lines, by raising it to a higher level and thence following by gravitation. For purposes of power in conjunction with a turbine where stationary engines are now used, doing away with engines, engine houses, boilers, coal, oil, engine drivers, stokers, etc. By water works for raising water to different levels instead of the present costly pumps with the necessary engines, boilers, etc. By the use of this apparatus water works companies are in a position with the enormous supply of water at their command to utilise the water for supplying power and electricity and afterwards return the water into the reservoir to be used for its present purposes.

Maize Export.

SHIPMENTS TO DATE.

IN our last issue we published a statement showing the numbers of bags of maize shipped overseas from Port Natal during the nine months ending with September; and as information of this nature will probably be found of interest and of value by a considerable section of our readers we propose to bring these figures up to date month by month, by means of weekly statements which are being supplied to us by the Railway Department. The figures we have received up to the date of going to press enable us to bring the statement forward to the 13th November.

The figures in the statement which follows include shipments to Cape ports.

EXPORT OF MAIZE.

Statement showing Number of Bags of Maize exported through Port Natal from 1st January to the 13th November, 1909, from Natal, Orange River Colony, and Transvaal Farms.

Maize Received from —	Shipped to 30-10-09.	Shipped during week ended—		Total Shipped to Date.
		6-11-09.	13-11-09.	
Natal—	Bags.	Bags.	Bags.	Bags.
Main Line	6,176	4,178	...
South Coast Line
Richmond Line	3,126	3,119	...
Cape-Natal Line	1,727	1,652	...
Stuartstown Line	1,250	2,150	...
Greytown Line	4,459	7,244	...
Estcourt-Weenen Line
Upper Tugela Line	3,433	2,651	...
Loskop Line
Total for Natal	234,386	20,994	275,551
Orange River Colony	468,439	3,807	481,811
Transvaal	96,950	1,440	101,168
GRAND TOTAL	799,775	26,241	858,530

Sulphur sprinkled about the barn, in the crib and in stacks of grain is recommended to drive rats and mice away.

Division of Agriculture and Forestry.

REPORT FOR OCTOBER, 1909.

THE past month has been a busy one at all stations. The compulsory sale of all working cattle from Cedara, occasioned by the detection of a single case of East Coast Fever, has necessitated the thorough overhauling of the traction engine after seven years' continuous service, with a view to its employment in a steam-ploughing outfit. The greater part of the area already under cultivation will be ploughed in this way before Christmas, and an additional acreage broken up to meet an increased demand for winter feeding crops due to recent acquisitions of sheep and mares for mule-breeding. The dairy herd, which is being stall-fed until such time as the risk of further infection may be at an end, continues healthy, and an opportunity is being found in such compulsory stalling for a continuance of a series of feeding experiments. The value of different leguminous meals, such as those of soy bean, cow peas, velvet beans and broad beans, as milk-producers is now being determined. Eight eland calves of this season's catching have been delivered and are thriving well. (The two-year-old eland are now being broken to harness. Silage crops of maize, teosinte, and Japanese and bulrush millet have been planted, and extensive plots of soy beans, potatoes, beggar-weed, etc., are above ground. The month has been exceptionally dry and rain is badly required. Further planting of mangolds and maize have been consequently postponed. Autumn-planted green manure crops of buckwheat, lupins and vetch have made good development and are now ready for the plough.

WINKEL SPRUIT EXPERIMENT FARM.

The manager, assisted by five students, is still busily engaged in harvesting the cane crop from some 120 acres, and about 30 tons per diem is being delivered by tramway to the Illovo Mill. It is estimated that this work will be completed early in December with a total delivery of at least 2,000 tons. The resulting revenue will cover the entire working expenses of the Station for the year, exclusive of sums derived from other sources.

WEENEN IRRIGATION STATION.

The month of October has been very dry at this Station, with a high range in temperature, the maximum record reaching on several occasions 100 degs. F. The partial drought has necessitated liberal irrigation of cereal crops, orchards and lucerne fields. All fruit is running smaller in size as a consequence than last season.

All varieties of winter barley except one have now been harvested,

Manitoba being the first to mature, followed by Algerian, Gaza, Damascus and Brewing in the order named. Most of the grain is of a good malting sample, and the thrashing results will be available next month.

Yorkshire Hero peas have again yielded about 2,000 lbs. of clean grain to the acre.

The wheat on the two new blocks is ripening very fast, with the Federation leading. The latter type should be off the ground by the 8th November. The Standard Fife will be at least twelve days later. On the Quantity of Seed Plots, from present appearance, that receiving 40 lbs. of seed promises the best results. On the Manure Plots wheat which received 200 lbs. superphosphate is standing 5 ft. 6 in. high, with well-formed ears, while that on the unmanured plots does not exceed 3 ft. in height.

In the Variety Plots, Menenien from our own seed stands out in superiority, whilst the newly introduced American varieties already show considerable rust.

EMPANGENI STATION.

A first tapping of rubber from the Ceara plantation will be taken as soon as the partial drought has broken. The limit of profitable wattle cultivation would seem to have been reached at this centre, black wattle making little or no growth despite good rains received in the early spring. Cocoanuts, after hanging fire for some seasons, now promise to make better development. Trial is to be afforded to several types of Macaroni or Durum wheats at this Station, at the instance of Johannesburg firms interested in the manufacture of edible pastes. The climatic conditions obtaining at Empangeni approximate closely to those of the Durum wheat belt in Algeria.

WOOL EXPERT'S REPORT.

In connection with his work for the month, the Wool Expert, Mr. J. J. McCall, reports as follows:—

“On the first of the month there were 1,131 sheep under my charge on the Farm. At the beginning of the month I went to Ladysmith, accompanied by a student, where I gave a lecture and demonstration in the preparation of wool for market. On my return I had the various flocks yarded and had them round-tailed and hoof-trimmed. I found the maggot-fly very troublesome as they affected the sheep to a considerable degree, owing to the young green grass which caused scouring. On the 4th, I went *via* Nottingham Road to Insinga and Loteni, giving a demonstration at the latter place on the 5th at Mr. Brooke's farm. I visited two other farms and gave advice at both places on the sheep. Returning to Cedara on the 6th I erected a draining pen at the dip so as to minimise the loss of dip as much as possible. On the 11th I attempted to commence the shearing of the flock, but I was hampered by the lack of shearers. On the 13th I gave a demonstration at Mooi River, and

then visited Southdowns, where I gave an object lesson in culling and classing sheep. On the 15th I procured additional shearers and made better progress with the shearing. From this date until shearing was completed all the students had an opportunity of practical experience in shearing, picking up fleeces, throwing them on the wool table, skirting, glassing and packing. One and all seemed pleased to obtain the opportunity thus afforded of learning the up-to-date method of handling wool. Shearing was completed on the 26th and the wool was forwarded, 15 bales and 1 bag, direct to Messrs. Reid & Acutt's, Durban, for sale on the 3rd November, the balance, 6 bales, were sent to Umlaas Wool Washery to be scoured previous to sale. It is the intention to allow a party of students from the College, under my guidance, to attend this sale to gain further experience in the wool industry.

"During the month the flocks have done very well owing to a plentiful supply of green grass. With a few exceptions they were in very low condition owing to the hardships they had undergone prior to our obtaining delivery. There were a few of them lambing and in lamb, and of those three died during the month. We had several cold, wet nights, and the present lack of shelter, which will be remedied shortly, has been a considerable drawback to my obtaining the best result in the management of the sheep. I have had covered salt troughs placed out in the paddocks containing Liverpool salt. It is my intention, once the sheep have taken to the lick, to add either Stockholm tar or some other compound which may tend to repel the ravages of intestinal worms so prevalent in this district during the winter months.

"I am also dipping at frequent intervals, to minimise the danger from the bont-tick, the cause of heart-water in sheep

"I am now in possession of 1,000 doses of vaccine for the prevention of blue-tongue, obtained from the Laboratory of Dr. Theiler, Transvaal, by your directions, and I shall inoculate, say, 50 sheep, comprising small lots from each flock, as a preliminary to inoculating the balance, with a view to watching the effects of the vaccine so as to avoid possible disaster.

"I have classed the Merinos—ewes and rams—into three grades, according to quality, and have branded them accordingly. Having more rams than we can profitably use on the Farm, it will be possible to dispose of some to advantage.

"I can only speak with satisfaction of the way the work has been carried out by the students under my charge. A special word of praise is due to student Reid for the painstaking way he handled the wool in my absence from the Farm.

"It may be satisfactory to state that four of the 25-acre paddocks, used in rotation, carried 10 sheep to the acre for five weeks without unduly hurting the vegetation. I have now eased those paddocks off for

three weeks, to allow the grass to obtain a good start when I will replace the flocks, at the same time putting the rams with the ewes.

"Before closing this report, I may mention that it has been my custom to invite farmers to communicate with me on any matters concerning their flocks or wool. In response to this invitation quite a few of the farmers have asked for my opinion and advice. Where I have been notified, I have always communicated with the wool brokers requesting their assistance in drawing buyers attention to the clips where an honest attempt has been made to get it up properly. I annex an extract from a letter from one of the brokers which was elicited by a previous one from me on the foregoing subject. I would beg to emphasize the remarks made therein *re 'tendency towards cross-bred strains'* as this tendency has been impressed upon me during my recent visits to the various districts."

EXTRACT.

"We note your remarks with regard to the two clips for the Loteni district, and you may rely upon our bringing to the notice of the buyers the way in which these clips have been got up. It has been our ambition for many years, and we are continually advising growers on the desirability of getting up their clips in a better manner, and there is no doubt that each year a decided improvement is noticeable. But the one thing which worries us now is the fact that nearly all the best Merino clips are showing a tendency towards the cross-bred strains, and the number of really fine Merino clips seems to be getting less every year. We have before this pointed out in our reports the excellent work done by the Australian classifiers, and you may always rely upon our doing our best to second your efforts."

FOREST CONSERVATION.

The Chief Forest Officer, Mr. G. H. Davies, summarises the month's work in Crown Forests as follows:—

Foresters Tustin and Chilvers report, having transplanted seedling trees from places where abundant to areas destitute of them in Impedene and Zuurberg Forests respectively. The season is rather young for this, especially in view of the drought generally reported elsewhere, but conditions may be more favourable at the Ingeli. Forester Foster notes that a clearing in the 'Ngomi which he has specially protected is being rapidly regenerated by self-sowings. Our native bushes are so vigorous that I believe that they would recover from all the injuries done in the past (wherever the veld has not established itself) if simply protected from fire and improper felling. This, however, would be a slow process and requires the assistance of the Forester in judicious sowings and trans-

plantings, both to hasten results and to give the best timber the advantage. The Forester should use discrimination in this work: noting the species of most value flourishing near to the area to be treated as an indication that such species is most likely to succeed there. Introductions of kinds not found in the vicinity should be on a smaller scale as experiments.

Alienated forest is beyond our reach, however vigorous its regenerative powers may be, and past experience does not conduce to hopefulness about the fate of natural forest handed over to private owners. Imppecuniosity, greed, and carelessness are rapidly reducing native bushes on farms to patches of scrub in inaccessible ravines, protected by rock and water from fire, and the veld has covered the sites of many ancient woods. In this connection Forester Leigh reports that the portions of the Entumeni Forest, so inadvisedly included in the European Settlement Reserves of Zululand, are being quickly cleared by native tenants and labourers for mealie gardens. The soil around is just as good for the purpose, but requires a little more cultivation and manuring to yield the speedy but temporary richness of cleared bush soil. The Foresters' report on the bushes on these alienated lots has been sent to you, but it is probably too late to prevent a mischief which could only have been provided against by including a representative of the forestal interests of the Colony in the original Delimitation Commission of Zululand.

Forester Fernando has completely marked up the two Xalingena sections near Riverside, and when the cumberers in B have been ringed they will both be in good order for final clearing. Forester Chilvers has done the same for the A section at Ingeli and started on B, but I have not as yet instructed him to ring in either. Owing to absences of the former Forester on military duty and the necessity of securing a substitute in a hurry, trees were marked beyond the intended boundaries of these sections, which are thus unduly large. This would have righted itself if the demand had kept up, but East Coast Fever has left on our hands a number of marked trees scattered over large areas, and I propose to leave the ringing of the cumberers in them until the sap is down next winter. Incidentally, Forester Chilvers finds that a copying-pencil makes as lasting a figure on trees as red lead, but thinks blue paint more permanent than either. When sections are in full working the pencil should be sufficiently lasting, and is, of course, much simpler to handle. Both Foresters have sent you various tree seeds—including those of *Ekebergia capensis*—during the month. Remarking on the *Elceodendron*, Forester Fernando points out that *Capensis* yields as good timber as *Croceum* (No. 14 of Reserved List), of the same character and known by the same vernacular names of Saffron and Umbonvane, and that it is equally deserving of protection. This division of timbers—many of unknown utility—into reserved and unreserved is of necessity tentative, and only

necessitated by the native demand for hut-building materials. The increasing plantation of acacias is rapidly decreasing this demand as far as Crown forests are concerned, and some day all the natural timber-bearing agencies may be classed as equally under protection.

Forester Fernando has prepared for the bamboos which are to be experimentally planted at Emkazen, as an alternative to acacias for wattles and poles for native use. The bamboo is one of the most useful of all plants, and its general cultivation will be of immense service for many purposes besides hut-building, in which it must become easily chief of all materials.

In October, fires damaged bush both in the Ingwangwane and Alexandra Forest districts, Forester Cruickshank reporting one at the Hlogozi—non-demarcated—Forest, and Forester Fernando two in his forests. The latter thinks that this is due to mere carelessness, and suggests that remonstrance from the Department of Native Affairs—say through Magistrates or Native Commissioners—might prove effective. I think that a spirit of wanton mischief, incited by the evidences of care taken to protect bush by fire-lines, has something to do with it, and I should like to hear of a few offenders caught and whipped or fined. The “umfaan” and “insizwa” have much of the monkey in them. Forester Cruickshank is unable to discover the perpetrator of the Hlogozi fire, but has been prosecuting several natives for minor contraventions, and I met him at Umzinto so engaged.

Eland at Giant's Castle are now formed into large troops for the summer. Guinea fowl are greatly increasing along the Berg, according to Forester Moller. Forester Symons reports his discovery of a cave near the Witteberg boundary of the Game Reserve, containing human bones, earthenware, and a carved stool, which he thinks to be relics of the Langabaleli rebellion. If not required at the Museum, these should be preserved at the Forest Lodge for exhibition to visitors. Forester Foster had an analogous find in the 'Ngomi: a sack containing a human leg bone, with other “drugs” of the native pharmacopœia, which, however, was of no historic importance, and handed over to the Natal Police as effects in the intestate estate of the late forest guard recently sentenced for the murder of an old woman for medicinal purposes.

THE CHEMICAL LABORATORY.

The Chemist, Mr. W. R. S. Ladell, reports that during the three months—August, September and October—60 samples have been received in the Chemical Laboratory, over 50 of which have been reported on. The chief feature of the work was the large number of soils examined, the exact figure being 26. A few supposed phosphatic rocks were analysed.

with disappointing results. It would be quite a relief to come across a really good sample of phosphate, but they appear to be few and far between.

Twenty-four samples of soil gave the following results:—

COMPOSITION % AIR-DRIED SOIL.

Description.	Available Potash.	Available Phosphoric Acid.	Moisture.	Organic and Volatile Matter.	Silica and Insoluble Matter.	Total Phosphoric Acid.	Total Potash.	Iron and Alumina.	Lime.
Soil from Braemar ...	0'0027	0'0022	3'1	10'4	78'2	0'042	—	—	0'120
Subsoil from Braemar ...	0'016	0'0019	3'0	10'5	78'6	0'032	0'087	—	0'145
Lower subsoil from Braemar ...	0'009	0'0027	1'2	2'7	87'8	0'019	0'142	5'3	0'118
Red soil, Highflats ...	0'009	0'0047	4'2	17'7	62'7	0'106	0'127	20'4	0'095
Soil, Highflats ...	0'015	trace	1'6	2'5	94'0	0'012	—	1'5	0'119
Subsoil, Highflats ...	0'028	trace	6'0	15'3	46'2	0'064	0'151	31'2	—
Clay soil, Highflats ...	0'012	0'0032	3'4	13'4	66'1	0'040	0'084	12'3	0'276
Sandy soil, Wilgevreden ...	0'025	0'0027	0'2	3'2	89'0	0'050	0'053	4'0	0'056
Soil, Wilgevreden ...	0'017	0'0047	0'8	3'0	92'4	0'049	0'096	2'9	0'056
Mountain soil, Wilgevreden ...	0'027	0'0041	5'0	21'8	42'9	0'080	0'250	30'9	0'226
Soil, Thring's Post ...	0'005	0'0032	1'6	5'5	89'5	0'040	0'004	6'9	0'070
Red soil, Thring's Post ...	0'009	0'0015	5'0	16'7	53'9	0'090	0'005	26'7	0'070
Sandy soil (Compensation ...	0'006	0'0019	0'56	0'64	97'9	0'030	0'014	6'8	0'120
Black soil (Flats ...	0'009	0'0027	7'3	12'1	67'1	0'070	0'003	10'5	0'120
Soils from Ladysmith District	0'002	0'0022	2'7	5'1	86'7	0'047	0'025	3'0	0'150
	0'003	0'0021	1'1	4'6	89'8	0'057	0'051	1'1	0'100
	0'002	0'0027	1'2	2'1	90'0	0'043	0'038	3'2	0'070
	0'003	0'0034	1'6	4'6	89'0	0'049	0'056	3'8	0'120
	0'004	0'0014	0'7	4'7	90'3	0'047	0'107	5'6	0'140
Durban District ...	0'010	trace	0'64	1'0	94'0	0'033	0'019	4'1	0'084
Ladysmith District ...	0'008	0'021	1'7	6'5	78'9	0'104	0'009	11'1	0'119
Helpmakaar (1) ...	0'019	0'004	3'7	0'9	88'5	0'042	0'063	5'9	0'153
Helpmakaar (2) ...	0'010	0'004	4'8	8'8	58'0	0'070	0'040	19'5	0'120
Hermansburg ...	0'010	0'005	1'9	5'1	81'5	0'070	0'083	10'9	0'052

Partial Analyses of Soils in Relation to Fertility.

The soils are extracted for a week with a one per cent. solution of citric acid. The extract is then filtered and the quantity of potash and phosphoric acid is estimated in the solution. The citric acid acts almost in the same way as the acids which are secreted by the root hairs of the plant, so that the quantity of chemical foodstuffs which the citric acid dissolves is a measure of the quantity which the plant will be able to extract from the soil and absorb for its own nutrition.

	Moisture.	Available Potash.	Available Phosphoric Acid.
Soil from Ingogo ...	2'9 per cent.	0'019 per cent.	0'0014 per cent.
Soil from 'Ngomi ...	3'5 per cent.	0'017 per cent.	0'0180 per cent.

A few rocks were examined, with the results given below:—

PERCENTAGES.

Locality.	Silica and Insoluble Matter.	Moisture and CO ₂ .	Iron and Alumina.	Lime (CaO).	Phosphoric Acid (plus).
Ladysmith (1) ...	70.9	5.4	8.0	0.56	0.153
Ladysmith (2) ...	85.0	4.9	7.3	0.62	0.175
Tweedie ...	27.7	...	...	...	2.5
Weenen ...	23.4	...	...	...	1.73
Harden Heights ...	...	...	...	...	2.46

Some samples of limestone were analysed, but none of them proved to be of any great value.

PERCENTAGE COMPOSITION.

Locality.	Silica, etc.	Moisture.	Carbon Dioxide.	Iron and Alumina.	Lime (CaO).	Magnesia and Alkali.
Newcastle ...	35.3	1.6	34.4	5.4	*4.8	18.5
Weenen ...	21.2	...	...	6.6	†11.8	...
Estcourt ..	12.2	2.0	35.4	12.0	‡8.5	29.9

	Per cent.
* Corresponding to Carbonate of Lime	... 8.6
† " " "	... 21.0
‡ " " "	... 15.3

A sample of shale from Dundee was examined with the following results:—

	Per cent.
Moisture ...	7.1
Organic Matter ...	64.5
Silica and Insoluble Matter ...	25.9
Phosphoric Acid ...	0.02
Unestimated ...	2.48
	100.00

Experiments were tried with a view to obtaining tar or oil from this shale, but it was found to be unsuited for the purpose.

Some wattle tar has been distilled on a moderately large scale, and I hope that I shall find time to examine the resulting oils in the near future.

WATTLE BARKS.

	Total Soluble Solids. Per cent.	Non-Tannins. Per cent.	Tannins. Per cent.
From Midlands ...	47.2 45.0 50.2 53.2	... ... 18.3 20.2	............
Various Sources ...	26.4 32.1 40.7 49.2	... ... 15.4 19.6	25.3 23.3 31.9 33.0 6.9* 11.4* 25.3 29.6

* The source of these barks is not known, probably they have been obtained from very young trees.

Samples of sugar beet seeds were tested as to their germinating properties. The following varieties were so examined:—

	Percentage of Germination.
White French ...	7.1
White Top Distillery ...	8.8
Grey Top Distillery ...	9.0
Green Top Distillery ...	7.3
Yellow Top Distillery ..	6.1

Two new preparations of maize, received from the Natal Mill and Elevator Company, were examined with interesting results. The average composition of the maize grain is given for the sake of comparison:—

	Pollard. Per cent.	Hominy Feed. Per cent.	Maize. Per cent.
Moisture ...	10.3	9.7	13.5
Ash ...	3.2	2.9	1.4
Fat ...	5.3	15.6	4.9
Crude Fibre ...	3.0	2.4	1.7
* Albuminoids ...	21.3	11.6	10.7
Total Carbohydrates ...	56.9	57.8	67.8
† Nutrient Ratio ...	1 : 3.3	1 : 8.0	1 : 7.4
‡ Nutrient Value ...	90.4	105.3	89.4

* Nitrogen multiplied by 6.39

† Ratio of albuminoids to "starch" and "starch equivalent" of fat, *i.e.*, fat \times 2.3

‡ Sum of Albuminoids, "starch" and "starch equivalent" of fat.

The chief difference between the Pollard and Hominy feed is that the former contains more albuminoids and less fat.

The Hominy feed appears to have been formed from the mealies by increasing the proportion of fat, and the Pollard obtained by increasing the proportion of albuminoids. Both these foodstuffs have a high nutrient value, and should prove useful articles of diet.

E. R. SAWER,

Director, Division of Agriculture and Forestry.

Central Experiment Farm, Cedara,

16th November, 1909.

East Coast Fever Regulations.

RECENT NATAL ORDERS.

During the past month a few fresh regulations and orders have been made by the Minister of Agriculture in connection with East Coast Fever, the chief area affected being Zululand. Government Notice No. 576 prohibited, from and after the 1st December, 1909, the removal of hides, horns, hoofs, hair and heads of cattle, cut grass, manure, litter from places where cattle are kept, and lucerne or other fodder, from, into, or within the Province of Zululand, except on permit granted by the Chief of the Veterinary Division, or by an officer of the Veterinary Department authorised by him to issue such permits; whilst, by Government Notice No. 581, the Minister of Agriculture also orders that from and after the 1st December all permits issued by Advisory Committees or Magistrates, or by Permit Officers appointed by Committees or Magistrates, for the removal of cattle, hides, hoofs, horns, hair and heads of cattle, cut grass, manure, litter from places where cattle are kept, and lucerne or other fodder, into, from, or within the Province of Zululand, shall be cancelled and become null and void.

In terms of Section 3 of Act No. 54, 1906, the Minister of Agriculture orders that, from and after the 1st December, 1909, no movement of cattle shall be allowed into, from, or within the Province of Zululand. Notwithstanding this prohibition, however, healthy cattle intended for immediate slaughter may be moved within the said Province on permit granted by the Chief, Veterinary Division, or by an officer appointed by him to issue such permits, and in special cases where it appears to him desirable, the Chief, Veterinary Division, or an officer appointed by him, is authorised to issue permits for the removal of other cattle within the said Province, and into the said Province from Vryheid and Ngotshe Divisions, or from the said Province into the Vryheid and Ngotshe Divisions, subject to such conditions as he may see fit to impose: removal to be made within the time and according to the directions contained in the permit, and not otherwise. The penalty for disobeying this order is a fine not exceeding £100, or imprisonment with or without hard labour, and with or without the option of a fine, for any period not exceeding six months. All orders heretofore issued, in so far as they are in conflict with this order, are superseded by the new order.

The farm "North Welton," belonging to Mr. Morphey, situated in the Impendhle Division, has, for the purpose of the East Coast Fever Acts, been declared to be a portion of the Magisterial Divisions of Lion's River, and all restrictions or regulations which now or hereafter may be in force in the Magisterial Division of Lion's River shall, in like manner, be in force as regards the said farm.

CAPE REGULATIONS.

Two Proclamations have been issued by the Cape Government regarding East Coast Fever. According to the first one, from and after the 11th November, 1909, the district of Bizana shall be taken and deemed to be a suspected district, and the following regulations will have the force and effect of law, *viz.*:—(1) It shall not be lawful to remove, or cause or allow to be removed, or permit to stray, any horned cattle from or into the said district of Bizana, or, except as set forth in Clause 4 hereof, from or into any of the areas within the said district defined in the schedule hereto. (2) If any horned cattle be removed or introduced or permitted to stray into the district of Bizana from any of the adjoining districts of the Transkeian Territories or *vice versa* or, except as set forth in Clause 4 hereof, from or into any of the areas within the said district defined in the schedule hereto, it shall be lawful for the headman of the location in which such cattle may be found to take them in charge with a view to isolating them as completely as circumstances permit, and to detain them in such isolation until such time as the Resident Magistrate of the district or other officer appointed thereto by him in writing, shall, after due enquiry into the circumstances of their removal, introduction or entry, issue instructions for their disposal, and such cattle shall be disposed of in accordance with such instructions. (3) It shall not be lawful to introduce any transport wagons or goods into the said district of Bizana, save and except through the port of entry established at Ngabeni Drift, provided that the horned cattle which have drawn such wagons or goods thither shall first have been outspanned on the Flagstaff side of the boundary, and that such horned cattle shall not themselves be introduced or utilised for the introduction of such wagons or goods into the said district. (4) Notwithstanding anything to the contrary in the preceding regulations contained, it shall be lawful for transport cattle in yoke, within the district of Bizana, to proceed from or into any of the areas defined in the schedule hereto, provided the owner or person in lawful charge of such cattle shall have previously obtained a permit from the Resident Magistrate of Bizana, Government Veterinary Surgeon or officer duly authorised by such Resident Magistrate to issue such permit. (5) Such permits shall specify the number of transport cattle to be removed, the place from which they are supposed to be brought and the destination to which they are proposed to be removed, and, as far as practicable, particulars of the marks and description of the said cattle. (6) It shall be lawful for the Resident Magistrate of Bizana, Government Veterinary Surgeon or other officer as aforesaid, in the exercise of his discretion, to refuse to issue any permit under the foregoing regulations, or, before issuing such permit, to require proof to be adduced that the transport cattle sought to be removed are free from disease and

have not been removed from or through any area declared or proclaimed to be infected. (7) It shall not be lawful for any human being, animal, article or thing, to cross the border from the district of Bizana into the Colony of Natal save and except through Middledrift, at which place human beings on foot shall be permitted to cross the border with their personal effects. (8) Any person contravening any of the provisions of the foregoing regulations, or any person, being the holder of a permit, removing transport cattle in excess of the number or cattle other than those therein specified, or any person obtaining a permit under false representations, or interfering with or molesting any police officer, headman or other duly authorised person in the performance of any duty imposed by this Proclamation shall be liable on conviction to a fine not exceeding fifty pounds sterling (£50) or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months, unless such fine be sooner paid.

The schedule to the above Proclamation defines the boundaries of the following twelve areas:—No. 1, Comprising Jwili's, Pata's, Zulu's, Mjanyelwa's and part of Mpekwas' Location, and Bizana Commuagage; No. 2, comprising Lobengulo's, Maxola's, Nkweyi's, and part of Patekile's Locations; No. 3, comprising part of Baleni's and part of Patekile's Locations; Nos. 4 and 5, comprising part of Baleni's Location; No. 6, comprising Mlindazwe's Location and part of Baleni's; No. 7, comprising Jama's and Mapini's Locations; No. 8, comprising Langasiki and Fungus' Locations; No. 9, starting from the junction of the Mzamba and Neingo, up the latter to a valley running down from Mahashi's kraal close to main road to Middledrift, up this valley to the main road, along the main road to Nkantweni kopje, down the Sikindanja stream to its junction with the Nqabeni, thence down the Nqabeni and Swane to its junction with Mount Ayliff stream, up Mount Ayliff stream to its eastern source along the ridge road to a vlel lying between the sources of the Izizityana and Mngolovu, down the Izizityana to its junction with the Mzamba, down the Mzamba to first point mentioned; No. 10, comprising Hlamandana's and Gazula's Locations; No. 11, comprising Magquzumana's and Ntutsona's Locations; No. 12, comprising Ntlozela, Mbono's Locations and part of Billy's and part Mpikwa's Locations.

By the second Proclamation, from and after the 11th November, 1909, the district Umzimkulu shall be taken and deemed to be a suspected district, and that the following regulations shall have the force and effect of law, *viz.*:—(1) It shall not be lawful to remove, or cause or allow to be removed, or permit to stray, any horned cattle from or into, or from one place to any other place within, the said district of Umzimkulu, without a permit being previously obtained from the Resident Magistrate, either of the district of Umzimkulu or of the district from which it is proposed to remove such cattle, or from a Government veterinary surgeon,

or from an officer duly authorised by such Resident Magistrate to issue such permits. (2) It shall be lawful for such Resident Magistrate or Government veterinary surgeon or other officer as aforesaid, in the exercise of his discretion, to refuse to issue any permit under the foregoing regulations, or before issuing such permit to require proof to be adduced that the cattle sought to be removed or introduced are free from disease and have not been removed from or through any district or area declared or proclaimed to be infected. (3) Such permits shall specify the number of cattle to be removed, the place from which they are proposed to be brought and the destination to which they are proposed to be removed, and, as far as practicable, particulars of the marks and description of the said cattle. (4) Notwithstanding anything to the contrary in the preceding regulations contained, it shall be lawful for owners of farms in the district of Umzimkulu, who own farms immediately contiguous thereto but situated in an adjoining district, to move their cattle to such contiguous farms (but not to farms owned by them contiguous to the latter), and *vice versa*, provided that such cattle shall not be removed beyond the boundaries of such farms in the adjoining district. (5) Any person removing, introducing, or permitting cattle to stray or to be removed from or into the district of Umzimkulu, or from place to place within the said district, without a permit under these regulations, or any person, being the holder of a permit, introducing or removing, or causing to be introduced or removed, cattle in excess of the number of cattle other than those therein specified, or any person obtaining a permit under false representations, or interfering with or molesting any police officer, headman or other duly authorised person in the performance of any duty imposed by this proclamation, shall be liable on conviction to a fine not exceeding fifty pounds sterling (£50) or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months, unless such fine be sooner paid. (6) If any horned cattle be removed or introduced into the district of Umzimkulu from any of the adjoining districts of East Griqualand without a permit under these regulations, it shall be lawful for the headman of the location in which such cattle may be found to take them in charge with a view to isolating them as completely as circumstances permit, and to detain them in such isolation until such time as the Resident Magistrate of the district or other officer appointed thereto by him in writing shall, after the enquiry into the circumstances of their removal, introduction or entry, issue instructions for their disposal, and such cattle shall be disposed of in accordance with such instructions.

Keep the axles clean and oiled; dry or clogged axles add double or treble the work of a team.

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

A PRUDENT man, seeking land, should not take more than his means will allow him to cultivate in the best manner; for instance, if he has only money enough to buy cows or pigs, and everything necessary for ten acres, he will act foolishly if he takes fifteen.—*Martin Doyle and John Darton* (*"Cottage and Dairy Farming"*).

FORM OF COWS.

These should be of good shape and proportion, the head small and square, eyes large and bright, shoulders narrow, back level, rump well formed, haunches wide, thighs round, the udder not too long, round, elastic, and covered with silky down.—*Thos. J. Hord* (*"Milk Cows"*).

THE ORCHARD.

The best situation for an orchard or fruit garden is a gentle slope towards the South, South-East, or East. A north aspect should be avoided, and a West aspect is too much open to tearing winds, and too burning in the afternoon heat to be beneficial. A low, damp situation should be avoided, as no trees will do well and produce fine fruit if its roots are occasionally in water. At the same time a low, sheltered spot, if dry, is better than exposed high land, being less open to cold and violent wind.—*E. Watts* (*"The Orchard and Fruit Garden."*).

LOAM SOILS.

It has been demonstrated by practical experiments that one hundred pounds of sand will absorb twenty-five pounds of water; one hundred pounds of loam forty pounds; one hundred pounds of clay loam fifty pounds; one hundred pounds of clay seventy pounds. This explains why some soils always appear drier than others, why some soils will stand a drought so much longer than others, and why after an irrigation some soils become like a thick paste while others are dry. Sandy soils usually break up loose and mellow when dug, forked or worked in any way; black land is stiff, breaks up in hard clods when worked either too wet or too dry, and requires more cultivation both before and after plants are put in than does sandy soil.—*Lute Whicox* (*"Irrigation Farming"*).

CREAM.

In raising cream by the various setting methods, the milk should be carried to the dairy as warm as possible from the cows, and at once strained into the pans or creamers, which should be kept at as low a temperature as possible (above 40 degs. F.), whether by the aid of cold air, ice, or water. When milk is subjected to a rapidly falling temperature, as, for example, when it is set at 90 degs. F. in a dairy of a cold creamer at 45 degs. F., the cream rises with great rapidity. The reason is chiefly owing to the fact that fat, which forms the bulk of cream, has a lower specific gravity than the remainder of the milk.—*James Long and J. C. Morton* (*"The Dairy"*).

THE FUNCTION OF FERTILISERS.

The prevailing opinion in purchasing fertilisers is that they contain a certain amount of plant-food—usually nitrogen, phosphoric acid, or potash—in a more or less available form, and that the benefits received from their application is due to the addition of this plant-food to the soil. So deeply seated is this theory that all fertilisers are bought and sold on this basis, and laws controlling the business have been formulated upon it. The ingredients—nitrogen, phosphoric acid, and potash, with others—are necessary for the growth of all crops, but the amounts of the essential ingredients, other than the above-mentioned, are believed to be present in the soil in sufficient quantities to meet all the requirements of the crops grown.—*Samuel Fraser* (*"The Potato"*).

THE SOW AND HER PIGS.

A shallow nest is much the best, and many fine pigs, sometimes even whole litters, have been lost by giving the sow a too generous supply of bedding material. In warm weather, but little, if any, need be given and in cold weather, the nest should be thoroughly protected on the outside, and made so comfortable that a great pile of hay or straw will not be necessary to prevent the pigs from becoming chilled. About six or eight inches from the floor, and some distance from the sides of the pen, near the nest, a scantling rail, or pole, should be fastened; this will prevent the sow from crushing the little pigs between herself and the wall.—*F. D. Coburn* (*"Swine Husbandry"*).

The warm, clean, satisfied pig does not shriek so as to scare horses a mile away. Only the half-starved do that.

Farm and Garden Notes for December.

By GEO. CARTER, F.R.H.S.

"POVERTY BAY" RYE GRASS.

JUDGING from letters I have received I think that there must be a good deal of misconception regarding this grass, many farmers even thinking it something quite new. But after all this much-boomed grass is only an old friend Perennial Rye Grass (*Lolium perenne*) under a borrowed name, and reaching us here through an Australian source. It is the common Perennial Rye Grass grown and seeded in the Poverty Bay district of Australia, where the grass seems to do remarkably well. All sorts of ridiculous claims are made with reference to it, yet there is only one possible advantage which it can possess—that of an easier acclimatisation here, because the seed originates in a climate fairly similar to ours. I am not prepared to say that this claim is not justified, but it has yet to be proven in Natal. At the same time an experiment might be worth trying. Readers will remember that much the same claims have been made for certain Australian lucerne seeds, but the results of experiments here have not justified the payment of the much higher prices paid for the seed, as compared with the broad leaved "Provence."

Farmers in the mist belt should also bear in mind that Perennial Rye Grass has not been a great success in such districts, being very susceptible to the forage "rust"; and the Poverty Bay Rye Grass is also subject to the same attacks. As far as Natal is concerned, I think it has been proven that the Italian Rye Grass is much the better and more useful grass. Over the border—in other words, out of the mist belt—it is probable that the perennial variety will prove the better of the two, because of its more permanent nature.

DECEMBER CROPS.

The planting of mealies and the main crop of potatoes will be almost completed, and energies may now be directed to a few side crops. The serious long spell of drought during October and nearly half November will have delayed the sowing of grasses, and this work must be tackled.

CABBAGES.

Towards the end of the month the long-season Drumhead types of cabbage should be sown, including "Robinson's Drumhead" and "Drumhead Savoy." Most farmers are now drilling the seed in the field, with drills three feet apart, and using about two pounds of seed to the acre. But where labour is plentiful one-quarter of the seed will produce quite enough plants for an acre, in seed beds, to be transplanted to the field

when the weather is favourable. The right distance apart for the plants is three feet each way. Varieties such as Enfield Market, which do not take more than four and a half months to mature, may be sown later.

BEANS.

Another crop for present sowing are put into drills $2\frac{1}{2}$ to 3 feet apart, the plants standing 4 to 6 inches apart in the drills for field work. About forty pounds will sow an acre. The choice of variety will depend largely upon the market to be catered for. "Canadian Wonder" is probably the heaviest cropper still. The small, roundish, "White Haricot" is the one most free from disease, and always commands a good market for table use, and the same may be said of the Dwarf White Kidney. The Common Red (originally imported as "Fulmer's Forcing," I think) is in good demand for Kafir trade, and a good and early variety. Other colours and kinds are somewhat of a drag on the market.

SWEDES.

The first sowing of Swedes should be made in the middle of December in the colder districts. There is always the risk of "fly" taking off the first batch, and if this has been put in early enough there is yet time to re-sow without being tied down to Turnips. Sow three or four pounds to the acre, in drills eighteen to twenty-four inches apart, thinning out later to, say, ten inches in the drills. I would like to see far more Swedes sown in the Midlands for winter farm use. The exhibits at Camperdown Show last July were ample proof that they will succeed in such districts, and all Midland farmers would find them a wonderful stand-by during the winter and early spring for many purposes. Sowing, here, would be a month later.

MANGELS.

It is regrettable that those sown at the best time of all, October, have had such a bad time, and very few farmers have got a stand worth keeping. Seed sown now will not have necessary time for the fullest development, but still it is not too late yet to secure a good weight per acre.

CARROTS.

"White Belgian" and "Long Red Altringham" should be sown this month. Sow three to four pounds of seed to the acre, in twenty-one inch drills. This seeding is a fairly heavy one, but one has to bear in mind that one hot day, on the seedlings just up, plays sad havoc with such a tender plant. Thin to six inches apart in February.

ENGLISH SORREL.

This herb (*Rume acetosa*) is becoming a very nasty weed in certain districts of the upper parts of the Colony. It is of English origin, and the seed has probably come over in some of the grasses. In England it is grown quite extensively in gardens, a bed lasting about four years.

The change from the cold English climate to our warmer one seems to have increased its vitality, and its "couch" nature renders its eradication a most difficult task. On some farms it has quite taken possession of whole fields, and make them quite useless for most crops.

I have been casting about for some means of fighting it, but with very little success so far. In certain parts of the United States it is eradicated in a couple of years by heavy dressings of lime, five tons of lime to the acre being used. But, dear me, one could buy double the area of land with the value of this lime here, and the cost of such treatment is absolutely prohibitive. Of the methods suggested there is not one which is at all practicable here, and we are thrown back on our own resources and experiment. I have suggested to some that a heavy smother crop, either Japanese Millet or Cow Peas, would probably much weaken the hold of the weed, and if persevered with would eventually choke it out, while in the meantime giving a crop of at least some value from the land. Say one put in at once a heavy seeding (100 lbs. per acre) of the running variety of Cow Peas. These would form an impenetrable mass under which no weed would grow, and would continue so until the end of March, when they would have to be reaped for hay and silage to save them from the frost. After these are off, the ground should be immediately turned over, cleaned of the sorrel roots as far as possible, and immediately sown again thickly with rape. Sorrel develops wonderfully during our winter, hence the necessity for a winter smother crop as well as a summer one. If in the spring these two successive crops have not been successful in eradicating the weed, it might be necessary to continue the smothering process for a second summer. This is all theory I know, but I am quite certain that our only hope with this weed is to *smother it out*. A few months of bare fallow must be avoided until it has gone.

VEGETABLE GARDEN.

The Celery sown last month will soon be ready for transplanting. Trenches should be prepared a foot deep and three feet apart. The whole of the soil is thrown out of the trench on to the intervening ridge, and the bottom of the trench is then forked over. In the trench place six inches of rotten manure, well beaten down, and on the manure three inches of good soil. The young plants are then set in this soil, at about six inches apart, and well firmed down and watered. The balance of the soil which came out of the trench is left on the ridges, to be used later on for earthing up the Celery for blanching. In the meantime all the space between the trenches may be used for a crop of Beans or Lettuces, which will be used up long before the soil is wanted again for the purpose mentioned.

The first batch of Cauliflowers will also be fit to transplant, and if you have followed the hints of last month you will now have some well

spaced and vigorous seedlings, and a bit of good rich land ready to receive them. Transplant each one separately, with the trowel, breaking the soil as little as possible in the process, and firm in the plants well. Take no notice of the people who try to persuade you that the taproots should be broken to produce fibrous feeding roots. It is true that more fibrous surface roots are formed if the taproot is broken, but it is also true that the plants' "water pump" is gone, and that a source of food away down at the base is cut off. No one can persuade me that serious check in growth can be good for any plant.

The first sowing of Savoys (the Drumhead) should be made towards the end of the month. A successive lot of beans must be put in as usual. Let the strawberry runners go now, to form good young plants for next season's crop.

THE FLOWER GARDEN.

In speaking of the sowing of biennial and perennial flowers last month I omitted to mention one very important item, that is the Biennial Stocks. The "Brompton" and "Intermediate" types of Stocks are far hardier and more profuse bloomers than the "Ten-week" type. To bloom next spring, commencing about early August, the seed should be sown now, in shallow trays. The seed will germinate in a few days, and in a month will be ready for more room. Now, Stocks are not easy to transplant, being tap-rooted, and our usual method, for our own planting, is to first put them into two, or three, inch pots, and let them fill these with roots before we put them into the open garden. (All enthusiastic gardeners should have a few of these small pots about for use in this way, for many plants do much better for this double shift.) In choosing the plants for the permanent bed, put the dark green, long-leaved, vigorous ones on one side. They look by far the best, but are probably "singles." The rounder leaved plants, not so vigorous looking, somewhat more hairy, and with a tendency to curl in the leaf, are the good doubles. Choose these, therefore, for the final planting out.

There should be a few Dahlia bulbs still unplanted. If so get them in now to give you blooms when the spring-planted batch is over. Cut down just a few of the most vigorous Chrysanthemums right to the ground. These will start away at once, and will throw a profusion of blooms three weeks to a month later than those which are left alone. Late Chrysanthemums are extremely valuable, as they come in at a time when flowers are getting scarce.

Sow a good batch of Marguerite Carnations, to bloom from the end of April until July, and see that you get the "Giant" type. Balsams, Swan River Daisy, Celosia, Coreopsis, Dianthus, Helichrysum, Phlox will bloom well before the winter if sown now. Next month we will talk about the methods of providing plenty of flowers for the winter months.

Exchange Reviews.

Steamed Bone Meal.

A recent issue of *Agricultural News* contains a useful article in which a few of the uses to which steamed bone meal can be employed are mentioned. It is stated that steamed bone meal is an excellent phosphatic manure, containing a high percentage of phosphate of lime (about 60 per cent.) and a small quantity of nitrogen (about 1.6 per cent.). The phosphate is, however, all in an insoluble condition, and—like most other manures—it must be used with due consideration of the land and the crops, if its effect is to be profitable. It is hardly to be recommended on heavy land, except for such permanent crops as grass or fruit trees. All manures decay slowly—and all insoluble manures work slowly—on heavy soils, so that the gradual effect produced by bone meal on these soils is frequently not appreciable to the ordinary cultivator. On sandy soils or light loams requiring phosphates, steamed bone meal works well, but an improvement in the crop is more often seen when a dressing of potash is also applied at the same time. Phosphates do not appear to be necessary for the sugar-cane crop, but frequently give good results with fruit trees.

Manuring with Superphosphate and the presence of Lime in the Soil.

The presence of a sufficient quantity of lime in a soil to which superphosphate is applied is an important factor, since upon this depends, to a large extent, the manner in which the superphosphate is available for the growing crop. Mr. A. D. Hall, F.R.S., Director of the Rothamsted Experiment Station, in his book "The Soil" remarks that in an ordinary soil containing a sufficiency of calcium carbonate, the application of soluble phosphoric acid, like superphosphate, will chiefly result in the precipitation of di-calcium or "reverted" phosphate, wherever the solution meets with a particle of calcium carbonate. This di-calcium phosphate is a compound easily soluble in weak organic acids, or in water containing carbonic acid: hence the great value of applications of superphosphate on soils rich in lime, for thus a readily available phosphate is very quickly disseminated throughout the ground in a state of fine division.

On soils poor in calcium carbonate, the precipitation will be chiefly effected by the hydrated iron and aluminum compounds, and the resulting phosphates are practically insoluble in water containing carbonic acid, and but little in saline solutions, or in weak organic acids.

Hence applications of superphosphate to such soils become much less available to the crop, and should be preceded by a thorough liming of the land. Even a subsequent liming on soils containing phosphates of iron or alumina will help to bring them into a more available form, because a double decomposition will take place, resulting in the production of calcium phosphate and hydrate of iron. This reaction will proceed to an extent dependent on the proportion of lime present in the medium.

Separated Milk for Cows.

In a paper read by Mr. Campbell, Assistant Secretary of Agriculture, Ireland, on "Store Cattle, or Butter, Eggs, and Bacon," at the fifteenth meeting of the Council of Agriculture, he directs the attention of all interested in the subject to a series of valuable experiments which have been carried on for the past two years at the Clonakilty Agricultural Station. The experiments extended over two years, and were repeated three times on three lots of pigs. Separated milk and potatoes were fed to one lot; separated milk, potatoes, and meal to another; while the third received meal and potatoes, but not milk. Two questions were submitted by the Department of Agriculture to their expert, Mr. Duncan:—(1) What is the value of separated milk when fed to pigs? and (2) to what price must pork fall to yield less than one penny per gallon? Mr. Duncan's answer to the first question is that when pork was selling at 48s. 3d. per cwt., separated milk, fed as above, yielded 2d. per gallon; and in answer to the second question he says that so long as pork was selling at 40s. 4d. per cwt., the separated milk returned 1d. The experiment further showed that pigs cannot be reared profitably without milk. Mr. Duncan is now engaged in estimating by direct experiment the value of separated milk when fed to calves. Fed to winter-bred well-bred calves it may yield as much as when fed to pigs, but whether it yields as much when fed to the ordinary spring calf is very doubtful.

Effects of Glass, Metals, etc., in Cheese Making.

An important factor with which the cheese maker has to deal is the irregularity in the coagulation of milk with rennet. This irregularity may be traced to a number of sources, such as variation in the strength of rennet extract used, the quality of the milk, and the kind of utensil employed. Experiments were conducted by Mr. G. A. Olsen, of the Wisconsin Agricultural Experiment Station to ascertain the effect of different metals as compared with glass on the length of the coagulation period.

The experiments were conducted by placing milk in contact with the various metals for definite periods of time and afterwards observing the time required for the coagulation of such milk, with a standard solution of rennet, under uniform conditions. It was found that with the single exception of aluminium each of the metals tried produced a **retarding** influence on the rennet action. The most striking influence observed was in the case of milk in contact with pure nickel. Milk which had stood in contact with this metal for twenty-five hours at 87 degs. F. required four hundred and twenty minutes for coagulation with rennet and showed an acidity of 0.167 per cent. Under the same conditions milk in contact with glass required only nineteen minutes for rennet coagulation and showed an acidity of 0.207 per cent. Copper also exerted a decidedly retarding effect. Apparently glass exerted a more or less accelerating influence on rennet coagulation and was to this extent **beneficial** in action. The degree of effect was directly dependent upon the character of the glass.

Trypan Blue for Biliary Fever.

In the *Cape Agricultural Journal* for October, Mr. Walter Jowett, F.R.C.V.S., of the Veterinary Branch of the Cape Department of Agriculture, discusses a method of treatment for canine piroplasmiasis (biliary fever or malignant jaundice), recently discovered by Prof. Nuttall, of Cambridge University, and Dr. Hadwen, of the Canadian Department of Agriculture. These two investigators found that the **administration** of a dye known as Trypan blue, to dogs suffering from biliary fever, resulted in most instances in effecting a speedy cure. The **results** which are given of experiments made with the dye are instructive; they are as follows:—(a) Six dogs were infected experimentally with biliary fever (by injection of virulent blood), and subsequently treated with one injection of Trypan blue: all recovered. (b) Four dogs were injected in like manner, but did not receive drug treatment: all died. (c) One experimentally injected dog in which the treatment was attempted by the administration of a dose of Trypan blue *by the mouth*, also succumbed. (d) One dog injected experimentally and injected three days later subcutaneously with half dose of Trypan blue before parasites had appeared in its blood, remained well; as did also an animal which received a dose of Trypan blue and six days later an injection of virulent blood.

Trypan Blue for other Diseases.

Nuttall and Hadwen also, it is stated, tried one experiment with Trypan blue for East Coast Fever, but the drug exerted no curative action. Experiments are in progress, under (so it would appear) the

auspices of the Cape Department of Agriculture, with a view to ascertaining the curative action, if any, of Trypan blue on South African Redwater of cattle and Heartwater of sheep and goats. With regard to the former disease, Mr. Jowett remarks: "It is anticipated that the dye prove efficacious as a curative for this disease, as it seems to have done for the milder 'English' form of redwater (cattle)."

Lucerne, etc., for Horses.

A recent bulletin of the Utah Experiment Station contains the results of six tests which were made with lucerne hay in comparison with timothy for horses under varying conditions of work. It was found less difficult to maintain their weight with lucerne. The appearance of the horses in every comparison was in favour of those fed lucerne, and no ill results were noted on their health by long-continued lucerne feeding. Fourteen-hundred pound horses at hard work could be maintained in condition on 32.6 pounds of lucerne hay per day, and at rest 20 pounds was sufficient for the same horses. There is no doubt that the Americans feed their horses too much hay. It is common among farmers to allow the horses to stand to full mangers when not at work. But in London, the cab horses for example, are given hay for but two hours a day, in the evening. At the end of two hours the mangers are cleared.

Careful testing in decreasing the timothy hay ration one half has not shown that the horses required any more grain than before to keep them in equally good condition. Horses do not require a heavy ration of lucerne hay. Fed with grain, probably ten to fifteen pounds of it is equal to a manger full of other hay. As they become accustomed to the lucerne it may be increased a little, and the grain decreased. It is a rich food and should not be used as freely as hay with less protein.

Are there not some dark, damp corners in your cow shed where you can put in a window and let the life-giving sunshine and light get in?

Dry earth is one of the most useful adjuncts of the poultry house during the winter months. The dust bath furnishes both pleasure and health to the hen, both essential to large egg production. The wise poultry-keeper is on the outlook for opportunities to gather his supplies, as they can only be procured during the summer and autumn.

The Position of East Coast Fever.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 21st October to 18th November:—

Dundee District.—Outbreaks on the farms “Klip Rots,” east of main line, “Boschhoek,” west of main line, and “Bonny,” east of main line.

Weenen District.—Outbreaks on the farms “Hazelwood,” and “Zwager’s Hoek.”

Umvoti District.—Outbreaks on the farms “Bracken,” sub-division of “Rust,” “Highbury,” sub-division of “Hartebeestvlakte,” “Newnham,” sub-division of “Hartebeestvlakte,” “Maresdal,” sub-division of “Maresdal” and “Geluk,” Cambridge Wattle Co., sub-division of “Welgewonder,” “Mount Helen,” sub-division of “Wonderboom,” “Statin,” Petrus Vlei,” “Overloed,” and “Baviaan Krans.”

Alexandra Division.—Outbreaks on Crown Lands, adjoining Location No. 2.

Klip River District.—Outbreaks on the farms “Piet’s Hoek,” sub-division of “Reitfontein,” east of main line, and “Blanerne,” sub-division of “Roodepoort,” west of main line.

Krantzkop District.—Outbreaks on the farms “Kopje Aleen,” “Rugged Run,” “Broeders Hoek,” and “Elands Kop.”

Lion’s River.—Outbreaks on the farms “Ettrick,” sub-division of “Boschhoek,” east of main line, “Amberley,” sub-division of “Roode Spruit,” east of main line, and “Klipfontein,” sub-division of “Gelhoutboom,” east of main line.

New Hanover.—Outbreaks on the farms “Elands Spruit,” “Hope-well,” sub-division of “Spitzkop,” “Mooi Plaats,” and “Kromdraai.”

Camperdown District.—Outbreaks on the farms “Hammasdale,” “Pinmore,” “Eeling Lassie,” and Denby’s Estate, sub-division of “Leeuw Poort.”

Estcourt District.—Outbreaks on the farms “Craig,” west of main line, “Wildcroft,” shown on map as “Tempe,” west of the main line, and “Excelsior,” sub-division of “Boschhoek,” west of main line.

Umgeni District.—Outbreaks on the farm “Short’s Retreat,” “Springfield,” sub-division of “Ockerts Kraal,” “Dalmerny,” sub-division of “Slang Spruit,” “Lilliefontein,” “Albert Falls,” Lot A of “Uitoulught,” and among H. Pathon’s cattle at Albert Falls.

Newcastle District.—Outbreak on the farm “High Vale,” west of main line.

No record is kept of outbreaks in the following Magisterial Divisions:—The whole of the Province of Zululand, the whole of Victoria County, Umsinga, Vryheid, Ngotshe, Babanango and Paulpietersburg.

Among the Farmers.

THE ASSOCIATIONS DURING THE MONTH.

* * * *The attention of secretaries of agricultural societies and similar bodies is drawn to this section of the Journal, which has for its object the publication of reports of farmers' meetings, annual reports, presidential addresses, etc.; and it is hoped that full use will be made of the facilities here offered for the dissemination of news regarding such doings of the many associations all over the Colony as are likely to prove of general interest to readers of the Journal. In forwarding copies of presidents' reports, etc., correspondents are respectfully requested to make sure that they give the date of the meeting on the occasion of which the address was delivered or report read.*

DUNDEE.

THE eighth annual meeting of the Dundee Agricultural Society was held on the 6th October. There was not a very good attendance when the meeting commenced, but late arrivals swelled the number to quite respectable dimensions for a Dundee meeting. The minutes of the previous annual meeting having been disposed of the President, T. P. Smith, presented his annual report as follows:—

"Gentlemen,—I have pleasure in presenting to you the eighth annual report of the working of your Society.

"During the year a great deal of time at the meetings have been taken up with the subject of the much dreaded East Coast Fever. It is with regret that we see this disease still spreading to an alarming extent, not only in our district but throughout the Colony. In the interests of our community it was found necessary by our Society to appoint Mr. J. Dyson and myself as delegates to attend a meeting of the Sub-District Advisory Board, to impress upon the members the urgent importance of enforcing the stamping out system in Sub-District "B." By the invitation of the Board I accompanied a delegation to Pietermaritzburg to interview the Minister of Agriculture upon the matter. The result of that delegation proved satisfactory and we achieved our object. In my opinion we have yet to face a much graver state of affairs unless the Government decides upon a firmer line of action.

"Next in importance comes the Annual Show, which we held on the 11th and 12th of June. I am pleased to report that the Show was a record one, not only in number of entries but in attendance, and general satisfaction was given both to exhibitors and visitors. The success of the Show was largely due to the excellent prize list provided by the Society,

and which made a good impression upon the public. Since our last Show, in 1908, several important improvements have been made. A railway siding now runs through the grounds and a small platform has been erected in a most central and convenient position, which proved a great boon to exhibitors at this year's Show. Permanent sheep pens have also been erected at considerable cost to the Society, as well as fifty dog benches. The Produce Hall floor has been levelled up and the Horse Ring was put in first-class order.

"I would crave your indulgence for a short time in touching upon the several sections of the Show.

Horses.—The exhibits in this section were numerous and the quality quite equal to the fine display made in this section last year; the sporting competitions brought forth a large number of entries and created very great interest. Suggestions for the further improvements in this section will be laid before you during the incoming year.

Cattle.—It is unnecessary for me to state why there were no exhibits in this section.

Sheep.—The quality was the best seen at a Dundee Show, but the number of the exhibits was a little disappointing in view of the fact that the Society had expended so much upon substantial pens. Merinos, fine-woolled and robust-woolled types, were the principal classes filled, and I am of the opinion that a number of the exhibits in these classes would have taken honours at any show of sheep in this Colony, if not anywhere in South Africa. The Persian and bastard classes were not so well filled as we had a right to expect; those exhibited, however, were of good quality. These animals being now numerous and well suited to our immediate locality it is hoped that breeders will come forward next year and creditably fill the classes provided for them.

Goats.—The classes for Angoras were poorly filled; only one exhibitor brought forward entries of first-class animals. The milch goat classes were fairly well filled with exhibits of more than ordinary quality.

Pigs.—These were disappointing in numbers. No doubt this is accounted for by the difficulty of transport. It is earnestly hoped that this section will be better patronised at our next Show. I am convinced that we have not yet realised the importance of this industry.

Produce.—In spite of the unfavourable season we had the exhibition was generally of good quality, and the entries, although not as numerous as we wished for, were fairly satisfactory.

Manufactures.—This section was well filled and the quality very good. The pie fruits and preserves were particularly good. The thanks of the Society are due to the ladies who were responsible for bringing forward most of the entries in this section.

Poultry.—The display in this section was very creditable. The entries were numerous and the quality the very best. The Poultry Club

is to be congratulated upon the strides which have been made. It was admitted by gentlemen best able to judge that the Dundee Poultry Show was the best country display yet seen in Natal. The Poultry Committee will present a separate report; therefore it is unnecessary for me to say more.

"Dogs.—Early in the year a Kennel Club was formed under the auspices of the Society and was duly affiliated to the South African Kennel Club. The first display under the new conditions took place at our Show, and, judging by the exhibits, the Club has received every encouragement to go ahead. The Society is expecting much from this section in the future.

Implements and Agricultural Machinery.—A very fine collection of these was to be seen at our last Show. One exhibitor especially showed a collection such as never before seen at a country show in this Colony.

"I would like to take this opportunity of recording the Society's great appreciation of the kindness of those gentlemen who so liberally presented special prizes.

"The matter of obtaining judges is becoming more difficult every year. It is with great satisfaction that the Society learns that the Agricultural Union is taking up the subject of forming a Judges' Association. Until this is done we shall always experience difficulty in obtaining judges who will satisfy the general public. It is the intention of the Society to encourage the formation of the proposed Association.

"Our members now number ninety-two. This is not as it should be; we must endeavour to enlist the active interest of all the members of the community. Every existing member should be a canvasser for the Society. Gentlemen, I earnestly commend this matter to your attention.

"Another matter which should receive immediate attention is a working plan of our Showyard. This should be drawn up and all work done in future should be according to the plan.

"At a meeting held in June the Society authorised Mr. H. Ryley to buy for it a suitable building at the Military sale then about to be held at Standerton. He was given up to £150 as a limit to which he might go. I am pleased to say that Mr. Ryley was successful in purchasing a wood and iron building, 27 x 87 feet in dimensions, which will cost us, when erected here, approximately £100. The building is now in course of construction, and the Society's best thanks are due to Mr. Ryley for his services.

MEETINGS.

"During the year there have been five committee and six general meetings held. I regret to say that the average attendance was very poor. Gentlemen, the vitality of your Society depends on the unanimous active support of its members; if you allow the vitality to remain low the inevitable result will be general decay. I trust that you will see to this matter during the incoming year.

"Mr. A. W. Smallie attended the annual meeting of the Agricultural Union as your delegate; his very able report of what took place can be seen on application to the Secretary.

"Your thanks are due to the Mayor and Corporation of Dundee for the use of the Chamber during the year, also to your Secretary for the energetic and able manner in which he has conducted the business of the Society.

"I wish to thank you again for the honour you did me in electing me your President last year, and I trust that you will give my successor the same support and good will which you have accorded to me."

Mr. Smallie proposed the adoption of the report, with thanks to the President for his good work during the year. Mr. Tandy seconded and the report was unanimously adopted.

SECRETARY'S REPORT.

In presenting the balance sheet for the year 1908-1909, the Secretary, Mr. J. McKenzie, remarked that the credit balance, profit and loss account, amounted to £276 6s. 3d., an increase of £34 12s. over last year. The amount received in subscriptions was £98 14s., compared to £101 17s. last year. Taking into consideration the fact that Poultry and Kennel Clubs had been established this membership could not be regarded as satisfactory. A sum of £174 10s. 9d. was expended during the year on permanent improvements. The entrance fees for the Show were £26 6s. in advance of those for last year, and the gate brought in £102 10s., as against £96 the previous year. In 1908 the special prizes amounted to £114 4s. 6d., and the prize money paid out totalled £223 2s. 2d., the corresponding figures for the present year being £229 16s. and £316 16s. 3d. So far special prizes to the amount of £202 are promised for the next Show. The Secretary concluded his remarks by expressing a hope that entrance fees would in future be sent along with the forms, as it would facilitate the work and obviate much bookkeeping.

On the proposition of Mr. Walker, seconded by Mr. Springorum, the Secretary's report and balance sheet were adopted, the latter being subject to audit.

The Poultry Committee's report was next presented as follows:—

REPORT OF POULTRY CLUB COMMITTEE.

"We have nothing to report beyond the Annual Show and matters arising therefrom. Dealing with the Show first, your committee has great satisfaction in stating that the entries in our section were double those of last year, making in fact a third of the entries on the whole Show. We are pleased to say that the exhibitors were well satisfied with all the arrangements with the single exception of the housing of the dogs under the same roof as the poultry. Not only exhibitors but the public in general found fault with this arrangement and many were, on account

of it, prevented from enjoying the grandest show of poultry ever held outside the two large towns, in Natal. It has come to our knowledge that many large poultry fanciers have been favourably impressed, and if sufficient inducements are held out next year we can rely on our entries being greatly increased.

"Touching upon the exhibits, we have to remark that the most popular breeds appeared to be the Leghorns and the Wyandottes, with Plymouth Rocks running them very close. There were strong classes in many other breeds, and as an exhibition of poultry the section was a very representative one. As regards the cage birds and pigeons, little inducement was offered to exhibitors, but your committee hope to be in the position to bestow more attention on this interesting section at future shows.

"The judging was done by Mr. W. Dixon, assisted in a few classes by Mr. H. H. Jones Ikin, and these gentlemen, we are pleased to say, gave general satisfaction. We experienced great difficulty in obtaining judges, but as there is a movement on foot to form a Judges' Association in South Africa we hope that this difficulty will be overcome in the near future. For this and several other reasons we strongly recommend that the Society become affiliated with the South African Poultry Association.

"As to the prizes, your committee begs to report that the cup offered by the Society for the most points in poultry classes was this year won by the Social Farm with 211 points. This cup, together with the special prizes, which amounted to £22 11s. 6d., were a great attraction to exhibitors, and we are of the opinion that more money spent in this direction, especially in floating trophies, would be money well invested. The Society allowed the Club £30 for ordinary prizes, and we are pleased to state that only £24 of this amount was expended.

"Your committee has under consideration the need for slight increases in the entrance fees at next year's Show and the awarding of prizes in proportion to the amounts received as entrance fees, this being without prejudice to the degree of certificate awarded.

"We are pleased to learn that the Society has procured a suitable building for the poultry section; this will prove a further attraction to owners of valuable poultry. The number of pens at present owned by the Society is quite inadequate for our requirements, and we should be glad, if finances will permit, to have at least 300 more.

"Your committee recommend that in order to meet fanciers, an associate membership be instituted in so far as the Poultry Club is concerned, and that the fee for associate membership be fixed at 10s. 6d. per annum, this to entitle fanciers, *at shows only*, to all the privileges of full members. We further recommend that the President and Secretary of the Society be *ex-officio* members of the Poultry Club Committee, and

that a secretary be appointed to deal solely with matters affecting the Club."

Mr. Ryley proposed the adoption of this report. This was duly seconded by Mr. Smallie and passed unanimously.

KENNEL CLUB COMMITTEE.

CHAIRMAN'S REPORT.

"It is with pleasure I have to report that the above Club was formed in November last year, and in February we became affiliated with the South African Kennel Club."

"Our first Show was held on the 11th and 12th of June, when we had a total number of entries of 128, which, taking everything into consideration, was most satisfactory for the first year."

"We found ourselves somewhat hampered for room at the Show, and we felt it was a mistake for the poultry to be alongside the dogs, as the dog fanciers strongly objected to the noise caused by the poultry."

"From the financial statement which is placed before you you will observe that our receipts exceed our expenditure by 12s. The benching cost the Society £28 9s., and this can be regarded as an asset."

"It is the intention of the Club to apply for a three-point championship. In the event of being successful we anticipate that the entries next year will be increased at least threefold and it will be necessary to provide a great many more benches."

"The membership, I am sorry to say, has not reached the Club's expectations, but I am confident that this will improve as we make advancement."

"The adoption of this report was proposed by Mr. Walker, seconded by Mr. Norman, and passed."

All the above reports having been duly received, Mr. Smith announced that the next business was the election of officers for the ensuing year. He then vacated the chair, and the Hon. C. G. Wilson took charge of the meeting."

The result of the elections is as follows:—

President: Mr. T. P. Smith, re-elected.

Vice-Presidents (in addition to those who are *ex-officio*): Messrs. H. Ryley, A. W. Smallie, and F. Turton.

Secretary and Treasurer: Mr. J. McKenzie, re-elected.

General Committee: Messrs. G. M. de Waal, B. J. Humann, H. J. Walker, W. J. H. Muller, H. J. Head, C. T. Vermaak, J. Campbell, H. Greenhough, D. W. H. Tandy, T. J. Williams, A. L. Jansen, W. Springorum, R. Doidge, H. W. Walwyn, A. E. Norman, and D. M. Meaumann.

A hearty vote of thanks was accorded to the Secretary for his past services and the usual honorarium was voted.

Mr. T. P. Smith proposed that, in recognition of the long and valuable services rendered by Mr. Ryley, he should be made a life member. This was seconded by Mr. Turton and passed unanimously.

The following were elected members of the Poultry Club Committee: Messrs. H. Greenhough, W. R. Hesom, G. Buchanan, R. Doidge, A. E. Norman, and H. W. Walwyn, the last named to act as Secretary.

The following constitute the Kennel Club Committee:—Messrs. T. J. Williams, D. R. Cresswell, T. Fruin, H. P. Walker, and T. Longmoor, who will elect a Secretary from their number.

It was resolved that the President and the General Secretary of the Society should be *ex-officio* members of both the above committees.

The Poultry Committee having recommended that an associate membership be instituted for the benefit of fanciers outside this district, the question was now discussed, and, after some opposition, it was decided to accept the recommendation. This will allow members of other poultry clubs to become members as far as concerns the Show on payment of half the usual subscription—10s. 6d. instead of 21s.

A further recommendation of the Poultry Club Committee, *viz.*, that the Club affiliate with the South African Poultry Association, was discussed and accepted by the Society, with the proviso that the fee should not be more than two guineas; if more the matter of affiliation to be dropped.

The President pointed out that the Societies in other small townships canvassed the two large towns for special prizes. He considered that Dundee had every right to expect support from the merchants of the two large towns, as much as others had at any rate, and he proposed that the Secretary be authorised to canvass Durban and Maritzburg at some time convenient to himself.

The Secretary now read a letter from the *Natal Witness* in which the editor of that paper introduced Professor Carl Otto and asked the Society to support him in connection with experiments he was making with East Coast Fever. The farm Dumain had been placed at the disposal of the Professor for the purposes of the experiment by Mr. Meumann, and it was felt by the majority present that he should have a chance given him to prove the value or otherwise of his theory (which has been described in the *Natal Witness*). After a long discussion, it was however decided that the Society would have nothing to do with the experiment as a Society; a meeting of those interested would be held in the afternoon.

The next business was a letter in connection with tree-planting from Mr. Smallie, but as the meeting had already been a very long one an adjournment for a fortnight was proposed and passed. The meeting thereupon came to an end, the 20th inst. being fixed for the adjourned meeting.

ALFRED.

The annual general meeting of the Alfred County Farmers' Association and Agricultural Society was held at Harding on the 23rd October. Mr. A. G. Prentice, J.P., the President, presided.

The President read his annual report, which contained, *inter alia*, the following:—

"Gentlemen,—I deeply regret that owing to the spread of East Coast Fever and the consequent stoppage of all movement of cattle, your committee found it imperative to abandon the holding of a show in June last, but I trust that every endeavour will be made to hold one next year, as it is fatal to any Association to abandon the holding of a show for any length of time.

"I am pleased to tell that the overdraft at the Bank, necessitated by the building of the Product Hall, has been cleared off, and this is chiefly due to the efforts of the ladies of the district who kindly held a bazaar, which resulted in the taking of over £50, for this purpose. There only remains the Debenture Bonds to clear off. Several members have generously returned their debentures as a donation, and I earnestly appeal to others to do likewise.

"You will remember that during the last Session of Parliament the Government introduced a Bill for the building of a section of the Alfred County line to the Paddocks on the Murchison Flats, and that this Bill was practically thrown out.

"In April last, I invited Mr. Claude Manning, the President of the Lower Umzimkulu Progressive Association, who was working in this matter, to attend a public meeting here, with the result that a deputation, comprising delegates from both divisions waited upon the Government and received a promise to re-introduce the Bill the next Session. This promise has been kept, and the Bill has now passed both Houses of Parliament.

"I know that you are bitterly disappointed that the line was not passed as a whole, or that the first section was not at least to the Izingolweni, so that it would tap this Division, but your committee has done everything possible to this end.

"I am afraid that the outlook for us as a farming community is anything but a rosy one. We are surrounded on three sides by closed borders. The Cape Colony, once friendly, is now, owing to East Coast Fever, hostile to us, and owing to the prohibitive rates charged for mule transport down to Port Shepstone, our mealies remain in the crates unshelled, and our wattle plantations uncut; in fact everything we produce except wool is at present unsaleable owing to the want of railway communication.

"I wish to thank the committee for their assistance, and also the Hon. Secretary for the able way in which he has carried out his duties."

The Hon. Secretary and Treasurer (Mr. H. C. Hitchins) read his annual report, which was adopted. The Treasurer's statement showed that the Association had a balance in hand of £4 10s.

The election of officers for the ensuing year resulted as follows:—

President: A. G. Prentice (re-elected for the eighth time); Vice-Presidents: Charles Knok, J.P., C. A. Holwell, C. F. Rethman; Committee, C. M. Etheridge, Rev. S. Aitchison, J.P., H. S. Morgan, Dr. W. Case, J.P., W. B. Rethman, H. F. Rethman, Edmund J. Gray and R. G. Mack; Hon. Secretary and Treasurer: H. C. Hitchins.

DRONK VLEI.

A meeting of this Association was held at Creighton on the 30th ult. It is a matter of regret to the executive, and to those members who attend regularly and endeavour to promote the welfare of the district, that the attendance at these meetings is generally somewhat meagre.

Besides other items of importance, the meeting was called to consider the offer by Government of a piece of land adjoining, and to the west of, the railway station, for the purpose of erecting thereon an agricultural hall, etc. Having adjourned and viewed this site, the meeting decided that, as a much better site could be obtained by slightly altering the boundaries proposed, Government be asked to accede to the wishes of the Association. The ground in question is unoccupied, being part of the Town Reserve, and the allotment of the proposed portion to the Association would leave ample room for roadway, outspan, etc.

East Cast Fever was, of course, an inevitable topic, but the discussion was this time limited to the matter of compulsory fencing, Mr. Marriott maintaining, as he has always done, that the time to fence is *before* the disease makes its appearance in a district. It was stated that, while farmers in other parts of the Division had been liberally dealt with in this respect, it had been found almost impossible to obtain assistance in this neighbourhood. A strongly-worded resolution drawing attention to this was ordered to be sent to the Ixopo Advisory Board.

After some minor matters had been dealt with the meeting closed.

CAMPERDOWN.

At the annual meeting of the Camperdown Agricultural Society, the President (John Moon, Esq., J.P.), delivered the following address:—

The following was the President's report:—

"It affords me great pleasure in submitting this my annual report, and in doing so I would like to make a few remarks. This is our fifth annual meeting. We held our Show on July 23rd, 1909, and it proved to be a great success. We had about 800 entries, and I must say every entry was up to show standard. The classes for ladies were very well

entered for. The produce shown was more than a credit to the Colony, and would be hard to beat at any show held in South Africa. The horses were very good, both in numbers and quality. The Society's thanks are due to all exhibitors, and also to those who kindly gave prizes. Our best thanks are also due to those who took so keen an interest in the Society, as such an institution cannot be kept afloat without the interest and co-operation of all concerned. I hope the young men in this district will come forward and take an interest in the Society and all matters connected with agriculture. Our annual dinner was held on the night of the Show, and I am pleased to say was most thoroughly enjoyed by all those present. Almost everyone who attended the dinner offered to contribute a prize for next year's show, these contributions amounting to £80. The Cato Estates have promised the sum of £10 a year towards the funds of the Society, and I hope the Vanderplank Estates will do the same. Our very best thanks are due to the Catos for their donation. Generally speaking, the crops in the district have been good, and prices not much to complain about. I am extremely sorry to say that Tick Fever has got much nearer, and has already taken away cattle belonging to some of our members. I am afraid before long that there will not be many cattle left in the district and in the Colony in general, unless Professor Otto or someone else finds a cure for this dreadful disease. I think the thanks of every farmer in the Colony are due to the *Natal Witness* for the interest it has taken in assisting Professor Otto, and I am rather more pleased than otherwise to find the Government has not contributed any funds towards Mr. Otto's test. Let us be men and what we profess to be—'farmers.' If there is the slightest prospect of a cure being found, let us do it ourselves, and not run to the Government for every little thing. Townspeople have been crying out for years 'Farmers' Government' and 'all the money that is spent is spent on the farmers.' I must say that the Agricultural Department has been a big spending power, and all the money spent has been of very little avail, if any at all. Farmers and agricultural unions have held meetings throughout the year, but owing to the fact that none of these meetings have had and fast rules laid down, there always seems to be a difference of opinion. All that has been done has proved to be a failure, and to-day we do not seem to be any nearer a cure or preventive for East Coast Fever, or in any way stopping the spread of this dreadful disease. My opinion is the same as it was when I read my report about two years ago, namely that the only chance of preventing the spread of the disease is by stamping out cattle on the spot. Let us all hope that something may be done, and that in the near future, to save the cattle that are left. In conclusion, I would like to convey my best thanks to the Secretaries of the Society (Messrs. Walker and Burchell) for the able way they have carried out their duties. They have worked well for the Society, and have kept everything up to

the standard. I would like also to thank the judges and stewards for the way in which they assisted at the Show, and I hope every member will come forward and assist the Society to the best of his ability. As I have told you before, there is nothing to prevent Camperdown becoming the best produce show in the Colony.

Correspondence.

BOW YOKES.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Will some of your readers supply us with a copy of a clip for the bow ox yokes as we have had some made from the sketches you gave some little time ago in the *Journal*, but we do not seem to have got the clip right.—Yours, etc.,

LEARNER.

MAIZE EXPORT.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Can you or any of your readers answer a question that I have already vainly asked in the daily press? It is this: We have a Government official to grade our mealies sent forward for export, but, as far as the grower knows, all that he does is either to pass them as fit for export, or to reject them. My idea of a "grader" is "one who grades," or assigns each parcel of goods to its proper class. One would then suppose that it would be a case of so many grades so many prices, but the fact is that all mealies seem to be sold at the same price here, as long as they pass the grader. Is that so, and if so, why?

One other: Cannot you, Sir, or the daily press, publish frequent and full details of quotations on the Home mealie market? This is done in the case of many other commodities.—Yours, etc.,

PLOUGHMAN.

[The Official Grader grades the mealies as he finds them. If the grain is choice quality he certifies accordingly and issues the certificate to the shipper immediately the maize is shipped. Choice grain should, of course, fetch a better price than fair average quality, but that is a matter entirely between the farmer and his buyer; and the Grading Officer is in no way concerned. In reply to the concluding paragraph of "Ploughman's" letter, we would refer our correspondent to the "Markets and Crops" supplement of the *Journal*, which every month contains the fullest information available regarding the oversea maize market.—ED.]

SOUTH AFRICAN WOODS FOR RAILWAY COACHES.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—We are still desirous of obtaining woods grown in South Africa for the interior work of railway coaches.

Anybody interested in the supply of South African woods suitable for cabinet work is invited to communicate with the undersigned stating:

- (a) Where the wood is grown.
- (b) The names of the woods offered (state, if possible, both the botanical and South African names).
- (c) The approximate quantity of each kind available.
- (d) The average sizes in which the woods can be supplied (state approximate length, breadth and width of planks).
- (e) When the woods would be available for delivery.
- (f) The price per cubic foot free on rail any station in South Africa to be named by the supplier.

If suitable woods can be obtained we would make a trial of them in two State Coaches de Luxe, and we would require for this purpose light coloured woods of fine attractive figure for panels and darker woods for framings. About 400 cubic feet would be required for the two coaches, but if the experiment is successful greater quantities of the suitable woods would be required.

Any South African grown woods may be submitted and will be carefully considered.

It is essential that any supplies offered must be good, sound, mature timber felled in the proper season when the sap is not in circulation and well seasoned when delivered.

We would accept delivery free on rail at any station in South Africa in logs or planks.

All supplies would have to be subject to the approval of the Chief Mechanical Engineer, Pretoria, who would be guided by a sample log or plank to be furnished by the supplier.

A representative sample of each wood must be sent to The Chief Railway Storekeeper, Germiston Station, Transvaal.

Communications on this subject should reach me at the earliest possible date, and not later than the 10th December, 1909.—Yours, etc.,

GEO. BOWDEN,
Chief Railway Storekeeper.

Durban.

THE FARMER BOYS' PAGES.

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Conducted by "ARATOR."

** * Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.o. Editor, "Natal Agricultural Journal," Maritzburg.*

Implements of the Farm.

IV.—ROLLERS, SEEDERS, AND PLANTERS.

For breaking up quickly hard clods left by the plough, what is known as a roller is used. It is also useful for smoothing and compressing the surface of the soil. In principle they consist of a number of circular sections of heavy metal, held together on a spindle—on the same plan, in fact, as the ordinary lawn roller. They are made in different sizes, varying from 13 to 26 inches in diameter, and from 6 to 8 feet wide. In some forms they have smooth surfaces; in others the surfaces are fluted (in the latter case, they usually consist of a number of metal discs placed loosely upon a round axle). Whatever be the type of the roller, it is essential that it should consist of at least two sections, in order to offer less resistance in turning and to avoid tearing up part of the ground, which might easily happen were the roller to be made in one piece. By constructing it in sections, each of these is able, in turning, to move upon its own axis, some rolling forward while others roll backward. Obviously, the more sections the roller consists of the better.

The subject of rollers need not detain us further, since I think the construction and use of the implement will be readily understood from what I have said. We may accordingly pass on to the next, and an important, part of our subject: Drills and Planting Machines.

Drills are machines used for sowing seed. The old-time method of sowing grain was the broadcast method (which for some crops is still used to some extent), but it has been found that seed sown in drills yield a much better crop, and consequently machines for the purpose are employed even with such crops as oats, wheat, barley and other small cereals which used universally to be sown broadcast. Mealies, too, used to be planted by hand—although as a rule in drills or lines, except for forage purposes, when they are still sown broadcast,—but of late years mealie planters have come into use in South Africa, particularly in Natal, where they are very widely employed.

"A good drill," says a writer, "should sow uniformly the same quantity of seed, whether travelling on level ground, along the side of a hill, or up and down hill. It should adapt itself not only to all kinds of seeds, but to all conditions of seeds. The regulation of the quantity to be sown per acre, the shape of the coulters, and the steerage of the machine, are all matters of importance, but even sowing is the most important of all."

The principle upon which all drills are constructed is somewhat as follows:—A hopper holds the seed, which is usually mechanically agitated over one or more holes (according to the number of rows which the drill is designed to plant simultaneously), and is carried on two wheels, from which the mechanical action required for agitating the seed is derived. There is also, inside the hopper and just over the holes, a contrivance for the purpose of regulating the quantity of seed to be dropped. Passing through the hole in the hopper, the seed runs down a tube immediately behind a coulter which, as the machine is drawn over the land, opens a tiny furrow in the soil, into which the seed falls. The depth of this furrow can be regulated at will within certain limits by raising or lowering the coulter. To each hole in the hopper there is, of course, a separate tube and coulter. In some drills a rake or else a concave wheel follows immediately behind each coulter, covering up the seed as it falls into the furrow. In other makes, the coulter is so constructed that no covering device is necessary, the earth tending to fall automatically over the seed. In the mealie planter covering is usually effected by the main driving wheels.

With most drills the distance of the rows from each other can be varied at will. In the case of the mealie planter, both single and double machines are obtainable, the use of which enables the farmer to set his mealies in rows of whatever distance apart he pleases.

Drills can also be obtained which will drill in the manure required as well as the seed. The manure hopper is situated behind the seed box, and the manure runs through a tube into the furrow immediately in rear of the seed. Many of the American mealie planters have an automatic manuring device that works in this way, and the bone dust

or other fertiliser required for the crop can be sown at the time of planting, thus saving a lot of time and labour.

Some of the turnip drills on the market have provision for ridging. A large concave roller runs *in front* of the coulter, and this ridges the surface of the soil before the seed is sown, while the covering and firming down of the seed are effected by means of a flat roller following immediately behind the coulter.

Some farmers prefer, for various reasons, to sow their seed in plough furrows—for instance, in very light land, in order to give the plants a firm seed-bed. To meet the requirements in such cases, a sowing attachment can be obtained, for use with the plough. It is simply hooked on to an ordinary plough, and is equally suitable for a double or multiple furrow as for a single furrow plough. For some crops, of course, it is only necessary to plant in every second furrow. A drill for sowing mealies can be had for use in the same way. The seed is thus sown at the time of ploughing the land, and the ground is afterwards harrowed in the ordinary way, which covers the seed. This method of sowing, of course, effects a considerable saving in labour and time.

Machines are also obtainable for planting potatoes. There are two kinds manufactured—those constructed on the “cup” principle and those made on the “needle” principle. In the former case the potatoes or “sets” are elevated, one by one, from the hopper, by means of cups fixed to an endless chain, or a drum. They are then tipped over into a spout, down which they are discharged into the furrows. In the machines working on the “needle” principle, the potatoes are picked up, in the hopper, by a number of steel needles which are affixed to a revolving disc. The “cup” principle of machine appears to work the more satisfactorily.

Where broadcasting corn is preferred to drilling, and for sowing grass seed, distributors can be obtained, which save much time as compared with hand sowing and at the same time ensure a more even distribution of the seed. These distributors are made either for hand labour (on the wheelbarrow principle) or for animal power. The latter, being much larger, do the work much more elaborately: a 10-ft. machine will sow 25 acres a day, while 30 acres a day can be dealt with with a machine two feet longer. These machines are manufactured on different principles. In some cases the seed is agitated by means of a brush spindle running through the whole length of the hopper, and is so run through perforated copper discs and delivered evenly over the ground. The “brush” principle has, however, to some extent been displaced by the “cup” and “disc” machines. In the “cup” machines the seed is delivered by means of cups fixed to revolving discs, into tubes, through which it passes on to the apices of triangular blocks on a dis-

tributing board. These divide it, and it finally falls upon rows of pegs below, which cause it to fall evenly to the ground. The "disc" machines work on somewhat the same principle as the brush machines, with the difference that, instead of a long, continuous brush, "waved" discs are fixed on to the spindle, one over each delivery hole. These discs in their revolution wave the seed from side to side over the whole, so that, with each revolution, four deliveries of seed are made into the holes beneath; and the holes themselves can be altered in size in accordance with the quantity of seed it is desired to sow.

Agricultural Chemistry for Beginners.

By ARCHIBALD PEARCE.

CHAPTER III.

NITROGEN AND AMMONIA.

NITROGEN is an element of the highest agricultural importance. It is another gas, of which four-fifths of the air by measure consist. By nature it is exceedingly inactive, and does not readily combine with other elements, and this is the reason why, although so abundant in the atmosphere, various nitrogenous manures have often to be applied to the soil; for all plants must have nitrogen for their growth, and only a few have the power of obtaining it from the air. In the air it acts as a check on the active and voracious oxygen, diluting it, as it were, and preventing the too violent actions that would otherwise take place. The nitrogen that plants need is never absorbed into their tissues in its elementary form, but always in the shape of its compounds; accordingly nothing further will be said about it, but we shall proceed at once to its compounds, of which the chief are ammonia and nitric acid.

AMMONIA AND ALKALIES.

Ammonia introduces us to the class of compounds called *alkalies*, which are exactly opposite in their qualities to acids. They have a kind of soapy taste, and if applied to litmus paper that has been reddened by an acid they restore its blue colour again. Litmus paper is thus very useful as a test; an acid substance reddens it, an alkaline substance turns the colour back to blue, and if no effect is produced on either the red or blue paper the substance is said to be neutral. The alkalies act as bases, inasmuch as if mixed with acids they produce salts. The best known, besides ammonia, are caustic potash, caustic soda, and the alkaline earth lime.

Ammonia is a compound of nitrogen and hydrogen, in the proportion of 14 parts by weight of nitrogen to 3 of hydrogen. It is in reality a gas, but is very soluble in water, and this solution is the liquid commonly sold as ammonia. It is in almost all cases the product of the decomposition of animal or vegetable substances containing nitrogen. If a tuft of hair, or a few feathers, or a piece of horn be heated in a thin closed glass tube over a flame, we shall observe a few drops of a more or less evil-smelling liquid produced, and if we test this with red litmus paper, the presence of ammonia will be shown by the change of colour to blue. If a rotting manure-heap is allowed to get too dry, we can often smell the escaping ammonia, or show its presence by laying a piece of red litmus paper on the top, proving that the valuable nitrogen is being wasted. Any chemist will supply a little red or blue litmus paper for a few pence. The chief commercial source of ammonia is the gas-works, where illuminating gas is distilled from coal, which contains a small proportion of nitrogen; the ammonia is dissolved by the water in which the gas is washed, and the various ammonia products are manufactured from the solution.

Ammonia is generally believed not to be easily, if at all, assimilated as such by growing plants; it must first be converted into nitrates, as will be described in the next chapter. Most soils have the power of absorbing and holding ammonia, and not allowing it to be easily washed away, a property that is often of importance in a country subject to heavy downpours of rain.

Ammonia very readily combines with acids, acting as a base, and forming salts of ammonia, generally called ammonium salts. The best known of these are sulphate of ammonia (ammonium sulphate) and sal-ammonias (ammonium chloride). The ammonia in all ammonium salts is easily expelled by the action of lime; one can illustrate this important fact by mixing a small quantity of sal-ammoniac or sulphate of ammonia with a similar quantity of lime, when the ammonia given off is easily perceptible by the smell; in fact, such a mixture forms an efficient filling for smelling-bottles. From this we can see that lime must never be mixed with any manure containing ammonia on pain of losing its most valuable ingredient. This is the reason why Thomas Phosphate (basic slag), which contains free lime, should not be mixed with sulphate of ammonia, and why it is dangerous to put lime on a manure-heap.

SULPHATE OF AMMONIA.

Almost the only form of ammonia compound used as a fertiliser in this country is the sulphate. This should be in the form of a pale bluish-white powder. When chemically pure it contains 21.2 per cent. of nitrogen; but a good commercial sample will give about 20 per cent., equal to about 24.3 per cent. of ammonia. A rough test may be easily

them to resist the attacks of drought than would be the case on shallow soils.

If a soil is deep but has not been cultivated very deeply, it is as well to try and improve it by turning over more soil in ploughing, but care should be taken, if the soil is not very deep, not to go down far, for fear of bringing up too much of the subsoil, which is poisonous and is liable to ruin a field for years. A shallow soil can be deepened by bringing up just a little of the subsoil every now and then. This small quantity of subsoil will mix with the soil proper and become ameliorated by the oxidising of the elements it contains, as well as in other directions.

The matter of the weight of soils need not detain us long, as a few words in passing will be all that will be necessary. The weight of a cubic foot of soil varies greatly, depending as it does upon several factors. First of all, the actual nature of the soil—*i.e.*, whether it is peaty, clayey, loamy, or sandy—has the greatest influence upon the weight of a given quantity; then the soil may have been loosened by cultivation, or settled or pressed down hard. These are the chief factors influencing the weight of soils; but in order to give some idea as to the comparative weights of soils, the following figures will be useful. The samples of soils to which these figures refer were air-dried before weighing:—

A cubic foot of Peaty soil weighs about 49 lbs.;

A cubic foot of Clayey soil weighs about 66 lbs.;

A cubic foot of Loamy soil weighs about 76 lbs.;

A cubic foot of Sandy soil weighs about 80 lbs.;

It thus appears that a sandy soil is really *heavier* than a clay soil, but the latter is referred to as heavier because of its greater tenacity—as I have said in a previous article, it is spoken of a “heavy” because it is heavy to plough.

The above figures will give an idea of what an enormous weight of soil we move in ploughing. If we plough an acre of land to the depth of five inches only, we have to move some 600 tons of soil!

Soils differ in colour just as they do in other characteristics. Some are dark—even actually black—whilst others are reddish or chocolate, others again are grey, and between these there are innumerable shades of colour to be found. The colour of a soil is, of course, due primarily to the nature of the underlying rock foundations from which the soil has been formed during the ages. The principal colouring matters are humus and oxides of iron. But for these the soil would be white (as instance pipeclay and chalk). The most desirable colour for a soil to have is black, and white is the least desirable. The reason for this is that black absorbs heat while white reflects it; and consequently, other things being equal, it will be easily realised that, as heat is one of the principal factors in the growth of plants, the earliest and best plants will grow on the darker soils, and grey and white will yield stunted crops.

(To be continued.)

Weaning Lambs.

THAT there be no checks in the growth of lambs at weaning time the matter should have some consideration that will keep them improving. By providing lamb creeps they will soon learn to eat some grain or ground feed. When the lambs are four months old they should be weaned. It is best for the ewes and also for the lambs. If lambs have learned to eat well, they should be given the same quarters they are accustomed to and the ewes should be put in a barn out of sight of the lambs or there will be more demonstration. By putting the ewes on dry feed and not very much of that the udders will soon dry up. By giving the lambs the best of pasture and access to feed all the time, they will soon take to it and will receive but a slight check to their growth.—*The American Thresherman.*

When to Water Horses.

A HORSE should be watered before feeding, and never given a large quantity of water after a meal, for the simple reason that the water will wash the food out of the stomach before stomach-digestion has taken place, and the food will not be well prepared for absorption; and besides, it is sometimes the cause of colic.

There is a popular idea that a warm horse should not be allowed to drink, and unlike a great many other popular ideas, there is a little truth in it. If you water a warm horse in the ordinary way, letting him drink all that he will, you are likely to have a foundered horse on your hands. This is especially so if, at the time, the horse is fatigued. Nevertheless, it is always safe to allow him from six to ten swallows, no matter how warm he is. If this be given on going into the stable, and he be allowed to stand and eat hay for an hour and is then offered water, he will not drink nearly so much as he would, had none been given him before.

The danger is not in the first swallow, as we often hear it asserted, but in the excessive quantities that he will drink if not restrained. The most dangerous time to give a horse a full draught is when he has cooled down from fatiguing work and has partaken of a meal.—*Hawaian Planters' Monthly.*

Cracked wheat or maize makes a better feed after the chickens get old enough to eat it than either fed ground fine and made into a mush.

Meteorological Returns.

Meteorological Observations taken at Govt. Stations for Month of October, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.).				RAINFALL (IN INCHES).					
	Means for Month.		Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rainfall in 1 day.		Total for Year from 1st July 1909.	Total for same period from July 1st, 1908.
	Maximum.	Minimum.					Fall.	Day.		
Observatory ..	76.2	61.1	88	52.9	2.11	14	.80	31st	10.24	11.93
Stanger ..	80.1	60.1	99	51	2.75	11	1.48	30th	11.62	10.63
Verulam ..	83.9	58.7	94	50	1.83	7	1.24	30th	8.86	10.16
Greytown ..	81.3	46.3	97	35	1.57	10	.37	17th	6.34	10.82
Newcastle ..	84.6	41.5	97	34	1.08	7	.65	30th	4.96	12.23
Newbogatwini ..	78.8	56.9	92	47	2.97	12	1.10	31st	12.00	—
Estcourt ..	83.2	49.5	97	37	.08	7	.07	18th	2.32	6.18
Mid-Illovo ..	75.1	53.2	92	44	2.23	10	.80	30th	9.78	11.73
Ixopo ..	—	—	—	—	1.21	9	.32	30th	6.98	12.21
Imbizana ..	77.1	58.1	88	47	2.46	13	.67	30th	9.22	13.91
Port Shepstone ..	79.7	54.8	88	48	3.89	8	1.25	29th	11.00	16.90
Umzinto ..	89.5	51.3	95	50	2.35	6	.83	31st	11.48	12.10
Richmond ..	76.7	52.3	96	38	3.34	15	.75	29th	10.93	12.01
Maritzburg ..	80.5	53.7	102	42	1.50	13	.30	30th	6.56	9.48
Howick ..	77.9	51.0	95	38	1.06	6	.28	17th	5.67	9.37
Ladysmith ..	86.8	54.6	99	43	.60	7	.16	22nd	3.78	—
Dundee ..	82.3	54.6	94	42	1.25	8	.25	30th	5.91	8.57
Cam erdown ..	77.5	51.8	97	40	.91	5	.25	14th	6.58	7.58
Krantzkloof ..	72.9	57.7	91	48	2.93	9	1.30	31st	10.28	11.69
New Hanover ..	83.5	50.7	99	30	1.09	9	.36	30th	6.11	11.57
Krantzkop ..	83.3	39.6	95	36	.53	8	.36	17th	4.69	7.42
Lidgerton ..	79.1	42.6	94	34	1.36	9	.39	10th	6.05	9.45
Nongoma ..	76.5	53.9	88	41	1.66	6	1.12	31st	5.75	—
Ngomi Forest ..	73.4	50.8	91	40	3.85	17	1.33	30th	12.06	—
Nqutu ..	77.0	46.2	90	37	1.19	5	.42	30th	—	7.76
Mtanzini ..	82.8	54.1	95	50	3.15	6	1.45	30th	22.83	17.38
Hlabisa ..	81.3	59.6	95	53	3.41	6	2.30	30th	10.12	9.73
Melmoth ..	81.1	55.1	102	47	1.69	6	.48	18th	5.54	8.19
Umbombo ..	76.0	57.5	90	48	3.77	4	2.00	10th	8.14	12.38
Empangeni ..	81.7	59.3	97	50	2.56	4	1.68	30th	13.78	11.35
Point ..	—	—	—	—	2.37	8	1.00	31st	12.81	13.53
Nottingham Rd. ..	76.0	41.9	93	31	.55	4	.30	11th	3.50	—
Char estown ..	74.3	45.0	87	35	2.54	15	.61	11th	4.16	7.66
Utrecht ..	92.3	42.2	98	38	.68	1	.68	31st	3.07	—
Vryheid ..	76.9	52.1	96	43	1.52	8	.61	31st	5.29	11.60
Mahlabatini ..	80.2	50.6	98	38	1.66	1	1.68	30th	6.14	8.22
Bulwer ..	—	—	—	—	1.42	15	.51	30th	6.01	11.96

Meteorological Observations taken at Private Stations for Month of October, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.)		RAINFALL (IN INCHES).					
	Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rainfall in 1 day.		Total for Year from 1st July 1909.	Total for same period from July 1st, 1908.
					Fall.	Day.		
Adamshurst ..	101	40	0.71	6	0.30	10th	—	8.5
Hilton ..	94	39	1.05	11	0.23	4th	0.43	9.57
P.M.B., Botanical Gardens ..	—	—	1.53	12	0.26	1 th	0.93	9.46
Ottawa ..	—	—	2.51	9	1.3	31st	10.05	—
Mount Edgecombe ..	—	—	3.03	13	1.80	31st	11.71	11.77
Cornubia ..	—	—	2.73	—	—	—	12.12	—
Milkwood Kraal ..	—	—	1.69	—	—	—	8.09	—
Blackburn ..	—	—	2.21	—	—	—	10.51	—
Saccharine ..	—	—	2.4	—	—	—	10.29	—
Equeefa ..	92	53	2.34	10	0.65	3 st	9.88	11.95
Umzinto, Beneva ..	—	—	1.44	5	0.65	.0th	8.73	10.87
Umhlangeni ..	—	—	3.10	12	0.6	3 th	1.25	—
Eshowe ..	—	—	2.50	6	1.40	31st	—	—
Riet Vlei ..	—	—	0.34	7	0.11	17th	3.19	8.75
Cedar Hill Station ..	96	35	0.97	8	0.34	31st	3.82	—
Winkles Spruit ..	81	48	2.39	8	0.67	20th	11.16	13.35
Weenen ..	100	40	0.06	1	0.06	17th	2.76	—
Giant's Castle ..	8	52	1.71	8	0.35	25th	5.36	8.95

Coal and Labour Return.

Return of Coal raised and Labour employed at the Natal Collieries for the month of October, 1909 :—

COLLIERY.	Average Labour Employed.					Output. Tons. Cwt.
	Productive Work.			Unproductive Work.*	Total.	
	Above Ground.	Below Ground.	Total.			
Natal Navigation ..	370	647	1,017	18	1,035	27,024 —
Durban Navigation ..	255	581	839	—	839	16,928 —
Edlandsbaagte ..	285	597	882	10	892	14,071 10
St. George's ..	208	418	626	15	641	13,169 —
South African ..	129	801	430	69	499	12,714 5
Dumdee Coal Co. ..	252	425	677	—	677	10,465 13
Natal Cumbrian ..	223	330	553	3	556	10,044 12
Glencoe (Natal) ..	173	309	482	36	518	9,139 6
Tolama ..	113	388	501	17	518	8,146 5
Newcastle ..	80	344	464	—	464	6,993 14
Hatting Spruit ..	86	151	237	—	237	5,805 16
Natal Steam Coal Co. ..	91	214	305	—	305	5,475 19
Hlobane ..	87	201	291	20	311	4,366 15
Ramsay ..	78	129	198	13	211	3,744 9
West Lennoxton ..	56	86	142	—	142	1,686 13
Ballengeil h ..	62	107	169	16	185	1,020 17
§Dewar's Anthracite ..	10	11	21	—	24	117 —
LMoeklip ..	—	27	27	—	27	78 —
Burnside ..	—	—	—	326	326	46 6
Makadees Kop ..	3	—	3	—	3	6 —
Totals ..	2,561	5,306	7,867	513	8,410	181,044 0
Corresponding month, '08	2,183	4,797	6,980	765	7,745	128,016 15

			Productive Work.			Unproductive Work.	Total, Oct., 1909.	Total, Oct., 1908.
			Above Ground.	Below Ground.	Total.			
Europeans	..	..	194	168	362	77	439	387
Natives	..	..	478	3,278	4,156	299	4,455	4,201
Indians	..	..	1,489	1,860	3,349	167	3,516	3,157

* Cost Charged to Capital Account. § Includes September Return. † August and September returns.

Mines Department, Maritzburg, 6th November, 1909.

CHAS. J. GRAY,
Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal bunkered and exported from the Port of Durban for the month of October, 1909 :—

					Tons. Cwt.
Bunker Coal ..	..	..	..	..	74,316 12
Coal Exported ..	..	..	..	..	35,381 5
Total ..					109,697 17

* Customs House, Port Natal,
1st November, 1909.

GEO. MAYSTON,
Collector of Customs.

Return of Farms at Present under Licence for Lungsickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Craw	Ladysmith	Scab	Mrs. M. J. v d Merwe	Coolfontein
			Natives	Roosboom
			Natives	Marie's Kraal
			Natives	Goedgedacht
			Natives	Roopoot
			B. J. Nieuwjaar	Tylden
			P. Bartlett	Uithol
			R. A. Smith	Lombard's Kop
			J. Kumalo	Driefontein
			H. Illing	Krantzkloof
A. B. Koe	Portion of Estcourt	"	R. Mattison	Caleott
			J. v d Merwe	Lands End
A. C. Williams	Utrecht	"	J. F. Hopkins	Highfield
			D. Hartman	Roekop
			J. de Winnaar	Nitkomst
			C. Potgieter	Weigevonden
			P. Truter	Bate Spruit
			-- Lekhoff	Strydfontein
			Y. Hambridge	Roodekoppes
			Natives	Waterval
			L. de Jager	Quagga-drift
			Natives	Ventersplaats
			G. J. Keel	Zoetsmek River
			T. Uys	Kimpey
			S. Grobler	Waalhoek
			P. L. Uys	Location
			J. T. Clothier	Whitecliff
L. Tienor	Alfred	Lungsickness	Sigumu	Lot F
			Mgunansla	Omega
			Natives	Location No. 1
			G. M. Trickett	Owick Commonage
			Geo. Woodhouse	Hallwell
J. Ralfe	Lion's River	Scab	W. G. Shaw	Colbourne
			P. Marais	Maketooskop
K Ripley	Intonjaneni	"	S. Ferreira	Diepkloof
C. T. Vaughan	Paulpietersburg	"	Natives	"
			E. D. Wilson	Nmeve
R. Wingfield Stratford	Newcastle	"	J. H. Potgieter	Luckkraal
			H. Robus	Altoma
			Schwikkard & Co.	Boscobello
			Natives	Koppie Alleen
			E. J. Dicks	Essenwood
			A. M. Muller	Droogdal
			A. Towile	Majuba North
			J. van Rooyen	Asvogelskop
			L. P. de Jager	Sluiteldraai
			F. R. Muller	Leyden
			J. J. Duigenaar	Langton
			M. P. de Jager	Muller's Pass
			A. J. Johnstone	Battlefield
			Natives	Highvale
			G. Dimock	Alcedale
C. E. Walker	Portion of Estcourt	"	L. Lloyd	Hidecote
			J. W. Haw	Woodleigh
			J. Marais Jun.	Northcote
G. Daniell	Vryheid	"	Johnson & Clarke	Bergonis
			Mrs B. Webbe	Rustenburg
			C. Beneke	Langkrans
			A. Armstrong	Lekkerwater
			G. van der Wenter	Tintashift
			A. T. Davel	Brackspruit
			Natives	Tinta's Drift
			B. R. A. Rabe	Enyati
			M. T. Ferreira	Vaalkrans
			Natives	Waterfall
			J. van Rooyen	Welkeveden
			J. A. K. van Rooyen	Rusthants
J. R. Cooper	Nkandha & Ngutu	Scab	H. de Bruin	Rordepoot
			C. van Rooyen	Rooikop
			L. van Rooyen	"
			J. van Rooyen	Bedrog
			Natives	Selutshana
			"	Ngutu

RETURN OF FARMS UNDER LICENCE (*Continued*).

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
J. R. Cooper ..	Nkandhla & Ngutu	scab	Natives	Telezi
		"	"	Mkonjama
		"	"	Nondweni
		"	"	Mafethling
		"	"	Hlozagazi
		"	"	Dadala
		"	"	Nqudeni
		"	"	Gadaleneni
		"	"	Maweni
		"	"	Mafethleni
		"	"	Haladu
		"	Westbrook Bros.	Dalton
E. Varty ..	Western Umvoti ..	"	J. A. de Waal	Mazenkomo
		"	D. C. S. Nel	Highfield
		"	J. A. Graham	Driefontein
		"	H. Hunsmeier	Onres
		"	T. J. Maritz	Mt. Alida
E. W. Larkyn ..	Umsinga ..	"	F. R. Nel	Vermaak's Kraal
		"	Susezulu	Umsinga
		"	Natives	Location
		"	"	Gordon Memorial
		"	"	Vaalkop
		"	T. H. Dedekind	Harding
		"	Natives	Umsinga
		"	"	Myonyama
R. Mayne ..	Eastern Umvoti & Krantzkop ..	"	P. V. Strydom	Hill Crest
		"	Natives	Burleigh
		"	J. M. Zietsman	Paul's Rest
		"	Natives	"
		"	L. G. Nel	Glenboig
		"	Van Rooyen Bros.	Wouterfontein
		"	P. K. Bester	De Rust
		"	J. A. Nel	Bingley Dell
		"	L. M. J. van Rooyen	Scotsdale
E. W. Bowles ..	Ixopo ..	"	S. G. van Rooyen	Overvloed
		"	Tshelwani	A of S 55
		"	Bohejama	Lot K of 5
		"	Natives	Batmand
		"	"	Location No. 8
		"	"	Lot BB
A. H. Ball ..	Weenen..	"	"	Lot A of 8
		"	J. P. Lotter	Berg Vleit
		"	P. H. van Rooyen	Buffels Hoek
		"	P. P. van Rooyen	Doornkloof
		"	Naude & Lotter	Scottshoek
		"	J. T. van Rooyen	Belle Vue
		"	R. J. J. van Rooyen, Sr	Bird Spruit
		"	L. J. Fourie	Scotts poort
		"	P. R. Buys	Waterfall
		"	P. H. van Rooyen	Buffels Hoek
		"	T. C. Lotter	Waterfall
		"	Natives	Belle Vue
A. F. Smith (acting)	City, Urgent..	"	Umvoti	Zwartkop Location
		"	Dria	"
		"	Samuel	"
		"	Jantje	"
		"	Luduma	"
		"	E. Taylor	Taylor's Station
		"	Ramen	Ellis' Estate
A. J. Marshall ..	Dundee ..	"	Natives	Conterford
		"	McKenzie & Kruger	Dabray
		"	Natives	Klipport
		"	"	Biggersgat
		"	J. de Jager	Waschbank
		"	Natives	Blinkwater
		"	"	Hartebeestfontein
		"	"	Kamelboom Kop
		"	G. F. Dannhauser	Cardwell
		"	J. J. Gregory	Cotswold
		"	T. C. Koekmoor	Mayhole
		"	N. B. Swarts	Rooikop
		"	H. P. Walker	Town Lands
		"	C. J. Pieters	Zwartwotles
		"	Mrs. S. J. Kemp	Kelvin
		"	S. B. Jones	Caruavon
B. Klusener ..	Lower Umzimkulu	Lungsickness	Natives	Banff
		"	Nyapu	Berbeck

FEES FOR AGRICULTURAL ANALYSIS.

Orders will be received for eggs for sitting of the following breeds for immediate delivery :—Buff Orpingtons, White Leghorns, Silver Wyandottes and Plymouth Rocks.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible :—

Admittance of Students to the School of Agriculture.—House Master, Cedara.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown

Forests.—Chief Forest Officer, Isopo.

Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.

Agricultural Seeds, etc., for Irrigation Farming.—Curator, Govt Station, Weenen.

Fruit.—Orchardist, Cedara.

Accounting Business.—Accounting Clerk, Cedara.

Woollen Sheep, Woollen Classings, &c.—Wool Expert, Cedara.

Apiculture—Apiarist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry, Cedara.

Pound Notices.

NOTIFICATION is contained in the *Government Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :—

ON THE 15TH DECEMBER.

Camperdown—Black Kafir sheep, ram, no brands or marks.

Hatting Spruit, Dundee—Merino lamb, branded W near side, snick in left ear, and piece cut out of front of right ear.

Muden—Dark brown mule gelding, branded X on right thigh, L J M on both front hoofs, marks of harness; light brown mule mare, star on forehead, branded V (in circle) on right thigh, H on left thigh, L J M on both front hoofs, marks of harness.

Solferino, Gourton—Running on Mr. Hattingh's farm "Amatamo," and unable to be driven to the Pound: Black ox, branded on the right hip, indistinct. Seven Persian rams, black and white.

Umsinga—Running on the farm "Balgownie," and reported to be too wild to be driven to the Pound: Unbroken grey mare branded (P2) on right hind quarter, and black yearling filly.

ON THE 22ND DECEMBER.

Donnybrook—Black ram goat, probable value 3s., impounded on the 23rd October, 1909, by Natal Police, Mabelhiana; white ram goat, probable value 5s., impounded on the 2nd November, 1909, by A. E. Smith, Dronk Vlei.

Hlomo Hlomo, Ngotshe—Black stallion, no brand or ear mark, about 3 years old, probable value £10, impounded on the 4th November, 1909, by A. Delpont, "Wonderfontein."

ON THE 5TH JANUARY.

Donnybrook—Black ewe goat; white ewe goat; black and brown ewe goat.

Inhlazaty, Vryheid—Ewe goat, blue and white, poor condition; white ewe goat, lamb of above, poor condition, no ear marks.

Quden—Chestnut filly, about two years old, standing about 13 hands, appears to have slight nicks in ears.

Umsinga—Bay mare, branded C.B. on right leg, I C. on right leg, 89 on right shoulder.

NOTICE.

In terms of the provisions of the Pound Act, 1898, the Pound at Scotston, Polela Division, will be abolished, with effect from date hereof.

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

Farm Apprentices' Bureau.

LIST OF APPLICANTS.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | |
|--------|---------|--|
| No. 2. | Age 15. | Has had 18 months' experience of farming. Understands more about forestry than general farming. Speaks Zulu, and understands Dutch. |
| „ 3. | Age 24. | Colonial born. Has a knowledge of bookkeeping. |
| „ 11. | Age 18. | Has had two years' experience on a sheep farm in the O.R. Colony. Is particularly anxious to get back on a farm. Is very willing and obedient. |
| „ 13. | Age 20. | Is an orphan. Is anxious to learn farming. |
| „ 15. | Age 19. | Is desirous of learning farming. |
| „ 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. |
| „ 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. |
| „ 30. | Age 18. | Transvaal born. Has had experience on a mixed farm. Speaks Dutch and Zulu. |
| „ 34. | Age 18. | Has a slight knowledge of Zulu. Understands carpentry. |
| „ 35. | Age 21. | Has had five years' experience on farms. Understands cattle and horses and Agriculture. Is anxious to get back on a farm. |
| „ 39. | Age 19. | Has had twelve months' experience on a fruit farm in the Cape Colony. Speaks Dutch. |
| „ 40. | Age 24. | Has had a little experience of farm life. Understands bee-keeping. Is anxious to get on a farm. |
| „ 41. | Age 16. | Has not had any experience. Speaks Zulu. Understands carpentry. Has been engaged in a Solicitor's office for four years. Is very obliging and willing. Anxious to get on a farm. |
| „ 43. | Age 21. | Has a knowledge of Zulu. Plumber by trade. First-class references. |
| „ 44. | Age 19. | Strong, tall and healthy, good rider, fond of stock, and has some years' experience of general farming. Small salary required with board and lodging. |
| „ 45. | Age 19. | Has had five years experience on agricultural farms at Ladysmith and Richmond. Speaks Zulu. Is anxious to get back on to a farm. |

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 115.—Englishman, 26 years of age, steady and an abstainer, with a knowledge of cattle and horses, wishes employment on a farm in Natal (English preferred) as a handy man, with a view to furthering his knowledge of farming in this country. Is willing to accept food and clothing in a good home, for services, for a few months with the prospect of a small wage after the first three months.

No. 116.—Cape man, age 32 years; married, no children. Has been used to working with horses and mules all his life. Has good papers from his previous employers, and was in the employ of the Public Works Department for over five years. Is willing to do anything in his power, but cannot read nor write.

No. 117.—Englishman, 25, of good education, desires appointment as overseer on a plantation in Natal, and would pay a reasonable premium and give services free for a few months if necessary. Has had commercial, engineering, surveying and mining experience.

No. 118.—Pensioner from the Army desires to obtain post on a farm. Is particularly fond of gardening. Has excellent discharge papers and good testimonials.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 121.—Desires open air employment. Age 43. Life experience of agricultural pedigree and prize stock gained in Scotland. Has been six years in South Africa. First-class references and testimonials. Small salary required.

No. 122.—A young man, with life-long experience of cane-growing, desires employment as manager or overseer on a plantation. Experience has been in Queensland and Fiji. Is good at figures and capable of taking charge of books if necessary.

No. 123.—Married man, 35 years of age, with 5 years' experience on poultry and stock farm in California, wishes to get on to a farm in Natal. His wife is a good cook and handy in dairy. Would be willing to work for a very small wage or for their keep or a period of twelve months at least, after which they would expect some remuneration. Can produce first class personal references.

No. 124.—Practical man, age 35, unmarried, seeks position on any work. Can undertake or attend to any building work and erection of machinery, and has been accustomed to control of coloured labour. Could undertake management of small creamery. Not afraid of work. Has had considerable experience in Agriculture, and can produce highest references.

No. 125.—Single man, age 31 years. Was brought up on a farm in England. Is a tinsmith and plumber by trade, also has a good knowledge of carpentry. Speaks Dutch. Has been in South Africa for ten years.

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127.—An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement up to February, 1910. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 128.—Wishes to secure employment on a farm. States that he has a general knowledge of engineering, and has been employed on a large and well-known farm in the Richmond Division.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
Commissioner of Mines.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Notice.

OWING to the increasing demands upon our space, we have arranged to publish *quarterly* instead of monthly as hitherto certain standing reference matter. This matter will consist of (1) Scale of Charges for Vaccines, etc., at the Government Laboratory; (2) List of East Coast Fever Advisory Committees; (3) List of Executives of Farmers' Associations; and (4) List of Publications issued by the Department of Agriculture. In future readers will find this matter in the January, April, July and October issues of the *Journal*.

Do not let the cream stand around in an open pan or pail. Shut it up in a close pail or jar, where the air can not get to it. Bacteria mean nothing more or less than impure air coming in contact with the milk or cream.

Government Cold Stores and Abattoirs.**PIETERMARTZBURG.**

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

	Calves up to One Year old.	Cattle over One Year old.	For minimum number of 250 head per month.		For maximum number of 500 head per month.	
			Under 300 lbs. weight.	Over 300 lbs. weight.	Under 300 lbs. weight.	Over 300 lbs. weight.
1. Receiving per head	s. d. 0 3	s. d. 0 6	s. d. 0 6	s. d. 0 6	s. d. 0 3	s. d. 0 3
2. Killing and Cleaning "	2 3	3 6	2 9	3 3	2 6	3 0
3. Labour "	0 3	0 6	0 3	0 6	0 3	0 6
4. Disinfectants "	0 1	0 1	0 1	0 1	0 1	0 1
5. Bagging (4 Quarters) per body	1 9	3 0	2 6	2 9	2 3	2 6
6. Cleaning of Tripes each	0 6	0 6	0 6	0 6	0 6	0 6
7. Chilling of Beef, up to 72 hours or portion thereof per body	1 0	2 9	2 0	2 6	1 9	2 6
8. Chilling of Offal, up to 72 hours or portion thereof per set	1 0	1 0	1 0	1 0	1 0	1 0
Chilling and Freezing Beef—						
9. 1st week or portion thereof per body	2 0	4 6	3 9	4 0	3 6	3 9
10. 2nd " " " " " " "	1 0	4 0	3 3	3 6	3 3	3 3
11. 3rd and remaining weeks or portions thereof "	0 8	3 0	3 0	3 0	3 0	3 0
Chilling and Freezing Offal—						
12. 1st week or portion thereof per set	1 4	1 6	1 4	1 4	1 4	1 4
13. 2nd " " " " " " "	1 0	1 3	1 0	1 0	1 0	1 0
14. 3rd and remaining weeks or portions thereof "	0 9	1 0	0 9	0 9	0 9	0 9

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg, 21st December, 1908.

When you clean out the hen house, be sure to clean out all the nests and thoroughly spray them before putting in new straw or hay. They require as much and more attention than the roosts.

NATAL GOVERNMENT RAILWAYS.

RATE FOR CONVEYANCE OF SECOND-HAND TRACTION ENGINES AND TRUCKS.

It is hereby notified that a specially low rate has been arranged for the conveyance of second-hand traction engines and trucks from the neighbouring Colonies to Natal, required for transport purposes as a consequence of the East Coast Fever regulations. This rate has immediate effect, and particulars may be obtained on application to the Rates Office, Durban.

General Manager's Office, Natal Government Railways,
Maritzburg, October 23rd, 1909.

RATES ON SOUTH AFRICAN ROUGH SAWN TIMBER.

It is hereby notified that an alteration has been made in the rates for South African rough sawn timber in through traffic between N.G.R. and C.S.A.R. stations.

The following are the rates chargeable from the undermentioned stations to Johannesburg:—

From—	Per ton of 2,000 lbs.		
	£	s.	d.
Richmond	1	16	11
Maritzburg	1	15	9
Greytown	1	18	6
Hilton Road	1	15	4
Vryheid	1	11	7

Full particulars of the rates and conditions applicable to this traffic may be had on application to the Rates Office, Durban.

HEDLEY SALMON,
Acting General Manager.

Head Office, Maritzburg,
17th November, 1909.

SOUTH AFRICAN STUD BOOK.

A record of all classes of Stock; the object being to encourage the breeding of thoroughbred stock and to maintain the purity of breeds, thus enhancing their value to the individual owner, and to the country generally.

Application for Membership and Entries of Stock should be addressed:—

For CAPE COLONY A. A. PERSSE, P.O. Box 703, Cape Town.
 „ TRANSVAAL F. T. NICHOLSON, P.O. Box 134, Pretoria.
 „ ORANGE RIVER COLONY .. E. J. MACMILLAN, Government Buildings,
 Bloemfontein.

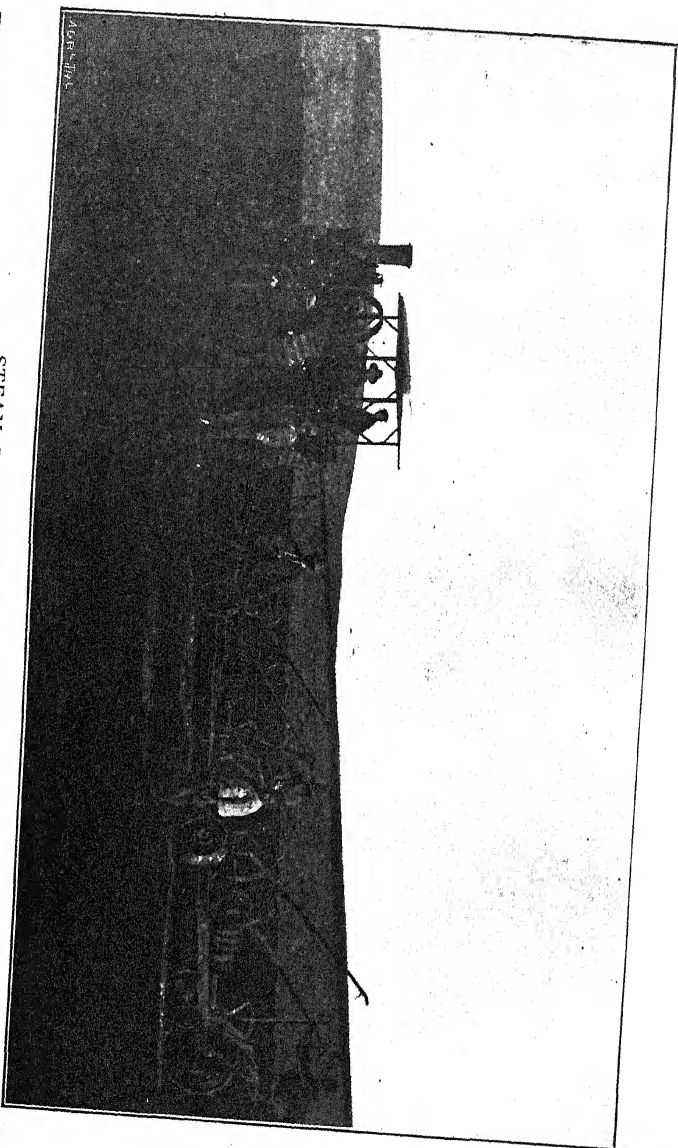
THE SOUTH AFRICAN STUD BOOK

IS OBTAINABLE OF:—

T. MASKEW MILLER,
ADDERLEY STREET, CAPETOWN.

PRICE 10s. 6d.

A. A. PERSSE,
SECRETARY, SOUTH AFRICAN STUD BOOK ASSOCIATION.



STEAM PLOUGHING AT CEDARA.

This season much of the ploughing at the Central Experiment Farm has been done by steam traction. The above picture is of especial interest at the present time in view of the prominent place in the public mind which the question of mechanical traction is at present occupying.

*The Natal Agricultural Journal.****The Farmer and Scientific Research.***

MR. A. N. PEARSON, who for some years directed the affairs of the Agricultural Division proper of the Natal Department of Agriculture, has truthfully said that one of the first experimental wants felt by Colonial settlers has been the trial of new plants and crops. This want has been met in the first instance by the establishment of botanical gardens, but, later on, numerous difficulties in practical agriculture, such as questions of soil cultivation and manuring, diseases and pests of plants and animals, the management of particular crops, and preparation of products for export, have presented themselves, and the need for more general experimental work having been felt, land has been set apart for what have been called "experimental farms"—or, to use the correct term, "experiment farms" or "experimental stations."

South African agriculture is teeming with problems; and the South African agriculturist is confronted by a set of conditions a full understanding of which cannot be obtained in the light of European and American experience only, but must be sought by long study, by patient experiment, and by actual experience of local conditions. To neglect agricultural scientific research is, in these days of strenuous competition for markets, to place the farmers of the country at a disadvantage in the race for prosperity; indeed, scientific research in the realm of agriculture may fitly be described as a condensation of experience: what it may take the combined wisdom of a whole community of farmers half a generation to discover, can be accurately ascertained—and, what is more, its causes located and described—in a few years of research at a properly equipped scientific institution. Appropriations to the use of a Department of

Agriculture are consequently, as Mr. Sawyer has justly remarked, investments, which yield a direct return by adding to the productive capacity of the country, so that "the farmer, when strengthening the hands of the Department, is directly forwarding his own ultimate interests."

We are led to these reflections by the appearance of a work which has just been issued by the Department of Agriculture embodying a first instalment of the results of researches which have been made at the experiment stations in Natal since the inception of the first station in 1902—memoirs offered, as the author, Mr. Sawyer, remarks in the Introduction, "in part payment and full recognition of the debt due by the Department of Agriculture to the farming community of Natal."* The volume before us is but the first of a series of three, and deals mainly with "The Cereals in South Africa," though partly also—to serve as an introduction to the study of the subject—with agricultural geology and chemistry; the two to follow will bear the respective titles of "Feeding Crops and Live Stock Experiments" and "Tropical Agriculture on the Natal Coast."

That the time has come for the publication of an authoritative work on cereals under South African conditions no one will deny; and that the lapse of the six years which have passed since the institution of the first experiment farm in Natal must have been attended with the accumulation of a considerable amount of data useful to farmers everyone will admit: in fact, Mr. Sawyer tells us in his Introduction that the "accumulation of data during the six years which have elapsed since the institution of our experiment stations, has rendered it a matter of no little difficulty to compress all available information within the limits of three volumes of modest proportions, and much material which would have been of interest to professional investigators has been compulsorily eliminated in favour of popular articles embodying interpretations of practical deductions from experimental data." The need for such a work as the one before us has of late years, and especially since the inception of the maize export trade gave an immense impetus to mealie growing and revolutionised all our ideas regarding the economic importance and the value as a farm crop (in this country at any rate) of "the miserable mealie." The want of scientific knowledge regarding the cultivation of this crop in particular has been rendered still more acute by the difficulties of ploughing and cultivation which have followed as a consequence of the existence of East Coast Fever in the country and which have naturally directed farmers' minds to a consideration of the claims, on economic grounds, of

* "CEDARA MEMOIRS ON SOUTH AFRICAN AGRICULTURE," by E. R. Sawyer, M.A., B.Sc., Director, Division of Agriculture and Forestry, Natal; Principal, Cedara School of Agriculture; formerly Assistant Secretary for Agriculture, Southern Rhodesia. Volume I., Containing Reports of Experiments in the Cultivation of the Cereals in South Africa. (Copies are obtainable from the Stationery Store-keeper, Colonial Secretary's Office, Maritzburg; price 10s. 6d.)

intensiveness in farming; whilst the additional ploughing difficulties which have this season been experienced as a result of the dry state of the soil through the want of rain will serve to direct attention to the question of conservation of moisture, in view of possible occasional dry seasons in the future. The *Memoirs*, consequently, make their appearance—the first volume, that is—at a time more suitable perhaps than any other in previous years; although the appearance of a work on cereals would have been warmly welcomed by the farmer at any time during the past three years, while it would always have been received with favour by a considerable section of the more progressive of our farmers. The present—the first—volume of the *Memoirs* will serve not only the larger purpose of presenting in popular form the conclusions which have been arrived at by science in Natal—and, where they apply to Natal conditions, to some extent elsewhere—as a result of investigations conducted on a proper basis and with proper continuity during the past six years, but it will also serve the useful purpose of directing attention to problems which perhaps have not yet been noticed to exist by our farmers, whilst it will also serve to emphasise the difficulties of scientific research, the care which has to be taken in drawing conclusions from data obtained from experiment plots, and the relative state of ignorance we are in regarding the many problems and the many strange conditions which go to distinguish South African agriculture from that of Europe and of America.

A rapid glance through the book, and a brief reference to the more important of its findings, will serve, perhaps, to give a rough idea of the scope of the work. Of the arrangement of the work we may remark that it is divided into seven “Reports” supplemented by three appendices. Report I., as we have already indicated, discusses agricultural geology and chemistry, the branches of these subjects more particularly touched upon being climate, the geology of Natal soils, soil formation and bacterial action, tillage, representative Natal soils, and phosphates and lime in Natal. The discussion of cereals begins with Report II., commencing with maize. This Report discusses some of the factors in the cultivation of maize, such as climate, types and varieties of maize, breeding, selection and judging of seed, mechanical working of the soil, times of planting and harvesting, and distance of planting; whilst in the succeeding Report the results of manure experiments with maize are given. Among the points here discussed are, the best quality of manure, modes of applying manure to maize, residues of manures, and profits of manuring. The question of the irrigation of cereals forms the subject of the next Report (No. IV.), maize, rice, wheat, barley, oats and rye all being discussed; whilst a section is devoted to “The Duty of Irrigation Water in South Africa.” Report V. deals with the rust problem. The millets receive consideration in the next Report, the points referred to more particularly being experiments with sorghum or Kafir

corn, manure experiments with millet, times of sowing millet, variety tests of millet, bulrush or munga millet, buckwheat, and teosinte. Report VII. deals with the commercial aspect of the subject—the market, demand and supply, cost of production, the fertility of the land, extensive and intensive cultivation, the place of machinery, distribution, State aid to agriculture, export of maize, grain handling in the United States, and so on. The appendices deal with the question of the manufacture of paper from maize stalks and the malting qualities of South African grains, and they also contain a useful table for converting prices of maize per quarter (480 lbs.) into prices per muid (200 lbs.).

From this brief examination of the structure of the book the extensiveness of the scope of the work will be to some degree realised; and to the foregoing we should add that the volume includes a large number of interesting photographs illustrating the various stages of the work. Passing now to a consideration of the matter itself of the work, it will serve a useful purpose if we set forth the findings which the author makes in each of the research sections proper of his book. Report II., we have said, discusses some of the factors to be taken into consideration in the cultivation of maize; and from the examination which is therein made some interesting facts may be deduced. We find, for instance, that a mean soil temperature of 70 deg. F. during the month of February should be taken as a minimum for profitable maize cultivation, and that in vlei lands this may be ensured by thorough cultivation and drainage. We find also that, as the maize crop rarely receives its full requirement of moisture during the months of January and February, an opportunity may occur for profitable irrigation at that season; that flint maize should be planted in the colder districts when the growing period is restricted by temperature, whilst, on the other hand, the highest profits will be obtained from the dent type in warmer areas; that early ripening varieties give smaller yields than those which complete their growth in a longer period; that seed selection is "one of the most potent factors determining the yield of the maize crop"; and that locally selected seed almost invariably gives better results than imported seed of the same variety. Among the recommendations made by Mr. Sawyer in this section of his book mention may be made of his advocacy of close spacing in the rows for all purposes at all centres; whilst he recommends—if indirect advantages be taken into consideration—a spacing of 4 feet between the rows for the midlands and high veld, and of 6 feet for the Natal Coast (that is, of course, when grain production is the object in view). Detasseling, stripping and topping are found to be operations of problematic value.

The third Report is concerned with the results of manure experiments with maize; and among the general conclusions reached in this section of the book we may note the following:—Dressings of potash

when employed with phosphates yield a considerable and progressive return on the Cedara soils as well as on such alluvial soils as are found in the Weenen Valley, and if phosphate be omitted from mixed manures the yield is a little better than without manures at all. Coast soils, on the other hand, benefit to a marked degree from nitrogenous manuring after the first year's cultivation, and no immediate gain appears from the use of potash. The best results in grain production, it has further been found, are to be obtained by applying all the manure in the drills and sowing the seed directly thereon. Frequent and light dressings of manure appear also to be more profitable than heavier and less frequent dressings.

The advantages of irrigation as applied to cereals are discussed in the fourth Report. We find that irrigation water may be very profitably applied to the maize crop during periods of partial drought, preferably six weeks after planting and at tasselling. As regards wheat, winter wheat of good milling standard, we learn, can be very profitably cultivated under irrigation in the warmer districts of Natal; and in this connection it may be mentioned that the Federation, Red Fife and Menenieu varieties have been selected as standard wheats for general cultivation, and that, in Mr. Sawyer's opinion, improvements in the wheat crop are to be sought rather by way of breeding and selection than by manuring. The optimum or economic quantities of water, including rainfall, for winter cereals under irrigation on land of average fertility, have been provisionally established as 22 inches for wheat, and 20 inches for oats and barley; a larger amount tends to reduce the yield. Rice of certain varieties can be grown under flood irrigation at the elevation of Cedara, and from the escarpment of the Natal high veld to the coast, but Carolina rice fails to mature in the cooler areas of the country. Mashona rice is the only upland form which has given satisfactory results in South Africa to dry cultivation; it is unsuited to flood irrigation. Manures applied to cereal crops, it is further interesting to note, have greater effect on irrigated than on unirrigated lands. Finally we may note—although this does not by any means exhaust the conclusions to be arrived at after a perusal of this interesting section—that April planting of all winter cereals promises the best results.

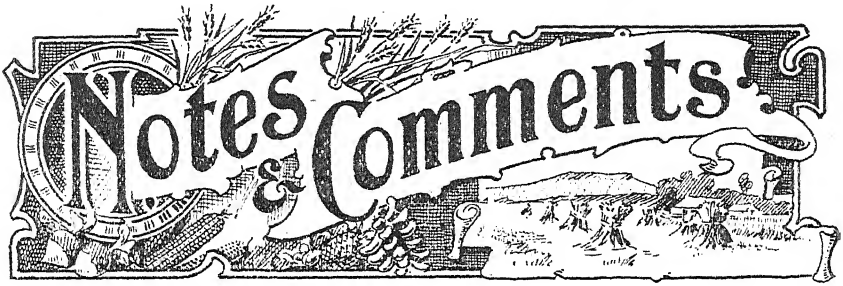
The rust problem is attacked in the fifth Report. In the climate of Cedara, wheat and oats can rarely be profitably grown as grain crops without irrigation, but heavy yields of forage and hay may be obtained from these crops by a suitable system of cultivation. Types which have shown a marked resistance to rust infection are referred to by Mr. Sawyer, but without pausing to examine them here we must hurry on to the next section of the *Memoirs*. This is occupied with the millets. From this Report we learn that Kafir corn in the climate of Cedara is a far more speculative and less profitable crop than maize; and that, furthermore,

no profit could be shown in connection to the operations of subsoiling and surface cultivation as applied to hillside lands at Cedara planted with this crop; whilst we note further that the large millets such as Kafir corn and bulrush millet respond to artificial fertilisers in similar fashion to maize, whilst in no case of a millet crop was a profit shown at Cedara as a result of nitrogenous manuring. On several occasions in the *Journal* in the past there have been references to Munga or Bulrush millet. Mr. Sawyer remarks in his book that this millet, though favouring a tropical environment, can be relied upon for a heavy yield of green forage, suitable for ensilage, in the climate of Cedara and on soils too poor for the profitable cultivation of maize; he adds that it shows greater drought resistance than either maize or Kafir corn. Of the smaller types, the Japanese (*Panicum crus-galli*) and German or Manna millets (*Choetochloa italica*) have, through a series of trials, proved the most satisfactory green-forage crops, while the Japanese buckwheat is one of the few annual crops which has produced reliably profitable crops of grain on unmanured lands at Cedara.

Such are a few of the facts which strike one upon a cursory glance through the first volume of the *Cedara Memoirs*, and they will, we think, together with the description we have given of the structure of the book, enable readers to form some idea of the large amount of practical ground covered by the work. We offer Mr. Sawyer our congratulations upon the satisfactory conclusion of the first volume of a useful work—a work which should occupy a prominent place on the bookshelf of every progressive farmer. For the present this very brief examination must suffice, but we may on a future occasion be able to refer in greater detail to some particular portion of the work bearing upon the most pressing of the problems which confront the agriculturist in Natal and South Africa.

A well-conditioned horse is preferable at all times. You cannot get horse-power out of skin and bones, any more than you can get fire out of scrap iron. It takes broad, plump muscles to do good hard work.

It has been notified, in terms of Proclamation No. 58, 1903, Section 29, Sub-section (e), that a reduction of 10 per cent. on tariff value of timber will be granted to sawyers holding licenses to fell in the Nogya (Mtunzini) Forest, Zululand, in view of the inaccessibility of the forest.



ANOTHER Christmas has rolled around, and another year is about to be completed and consigned to the limbo of the past—indeed, when these lines fall under our readers' eyes our thoughts will be of the New Year rather than of the Christmas season proper and the Old Year will be rapidly waning, even if it has not given away already to the New. Our wishes, therefore, to our readers shall be in respect of the New Year and the future; rather than for the season which is approaching at the time these lines are being written; and certainly good wishes regarding the future will be more welcome to the farmer and more to the point than wishes for transitory present jollity and happiness.

The commercial depression is now rapidly leaving us, if the signs which appear everywhere to be manifest can be relied upon. The Treasury returns have been greater during the past year, and this fact in itself serves as a good indication of the trend which things are following in the commercial and industrial world. The position of East Coast Fever does not present so much food for congratulation, however. Such a disease the Colony has never before had experience of, and, bad as the position may be to-day, it certainly would have been considerably worse had the repressive measures which the Government was able to take not been instituted. The fight is to continue, however, and more vigorously than ever, and we may reasonably hope to be able to record a very decided change in the position for the better when, at the end of the new year which is upon us, we glance backwards and contemplate the progress which the Colony has made in the past twelve months.

Two years ago, in a brief retrospect, we remarked, in speaking of the commercial depression, that when times became more prosperous we should find that the country had a greater degree of commercial stability than before the depression was experienced. We cannot say that a period of prosperity has yet been reached, but with the turn which things are now

taking towards the better, there is already a better feeling of stability than has been felt in the Colony for a long time past. This improved feeling, whilst it is not due altogether to the approaching political unification of the South African Colonies, owes at any rate a certain amount of its strength to the sense of security and stability consequent upon the great changes which are to take place in the course of the coming year. Union indeed has much in store for all the Colonies which are about to participate in it, and we have no hesitation in predicting that all over South Africa great changes will soon follow in the commercial and industrial sections of the country. The new year has much in store for us, and it will doubtless fall to our lot next year to record great changes in all directions. Let us hope that the burden of those changes will be Prosperity; in the meantime we can but look forward and hope for the best, and accordingly we would take this opportunity of wishing our readers, one and all,

A Happy and Prosperous New Year.

Correction.

The Chemist, Central Experiment Farm, writes as follows:—"With reference to the soil analyses on page 657 in the November *Journal*, the potash figures for three of the soils should read thus:—

	Available Potash.	Total Potash.
Soil, Thring's Post ...	0.004	0.005
Red Soil, Thring's Post ...	0.005	0.009
Black Soil, Compensation Flats ...	0.003	0.009

On page 659 the percentages of germination of the sugar beet seeds should read:—71.0; 88.0; 90.0; 73.0; 61.0."

A Novel Churn.

A correspondent has sent us the following cutting from an English newspaper, which we reproduce here, as we think it will be read with interest by many. We are unfortunately unable to acknowledge the source of the cutting, as our correspondent has omitted to mention the name of the newspaper from which he has taken it. The cutting is headed: "A Novel Churn: How Butter can be made in Two Minutes; and runs as follows:—"Butter made in two minutes! This, it is claimed, can be easily done with the Garbutt Patent Churn, which has created quite a revolution in the dairy world. That butter of the finest quality can be made so quickly seems incredible, but that it is quite possible has evidently been satisfactorily demonstrated, the makers having received for the churn the highest award at the London Dairy Show besides a large array of medals and testimonials. The principal advantages claimed for this churn are its immense saving in time and labour, superior butter, increased yield, that

large or small quantities can be churned equally well, and that it is adapted for all climates. Any churn possessing these desirable attributes undoubtedly marks an advance that will be appreciated by all who know anything of the hitherto tedious process of churning, and we have no hesitation in predicting for this very useful British invention a large and successful future. The makers are Messrs. R. Boby, Ltd., Bury St. Edmunds, England, who will gladly send full particulars to all interested."

Horsesickness.

The following circular memorandum regarding Horsesickness has been issued by the Militia Authorities:—In view of the fact that horses protected from the attacks of flying insects do not contract the disease Horsesickness, it is advisable to take such precautions as are possible to prevent the same. With this end in view, the following points should be remembered:—Infection occurs most frequently during the hours of twilight and darkness, *i.e.*, from an hour before sunset to an hour after sunrise. Where horses are exposed during this period, as in camp, bivouacs, etc., or where stables are open or much delapidated, a light dressing down with a rag soaked in paraffin oil, particularly over the legs and belly (which are the parts most readily attacked), will do much to deter mosquitoes and other flying insects from attack. The application should be made every evening shortly before sunset. Excessive application may cause soreness to the skin. This method, while of much utility, cannot be relied upon for entire protection.

Where good stabling is available during an outbreak of the disease (the memorandum continues), the chances of escape are greatly increased by keeping the stable filled with smoke produced by the burning of moist stable litter. In small stables a paraffin tin perforated at its lower end and sides answers the purpose of a receptacle for the fire. A brisk fire should be started—if necessary outside the stable—by the use of a little dry litter, or a handful of sticks, and a little dry manure added gradually until the fire is thoroughly established. The tin can then be filled up—not too tightly—with moister material, and placed in the stable. If thus arranged the apparatus will smoulder for many hours, and no risk of fire will be incurred. The fuel can be replenished last thing at night if necessary. The smoke, which is harmless to the horses, should be fairly dense, but not sufficient to cause coughing or sneezing. Adjustment of the quantity of the smoke is easily arranged. In strange stables, during an outbreak, or in those stables known recently to have contained an infected horse, the paraffin dressing should always be used. Transmission of the disease from a sick to a healthy horse is possible, particularly in close, warm weather. Slight attacks of the disease are possible—exercise during such a time is generally fatal.

The Hodder Water Elevator.

The article which we published on page 648 of our last issue, descriptive of the Hodder Patent Water Elevator, has attracted widespread attention, and we have received a large number of enquiries from readers asking for further information on the subject. We have little further to add to what we said in our last issue, but we may say that the Auto-Hydraulic, Ltd., 108a, Cannon Street, London, E.C., are the manufacturers of the plant, and that Mr. C. E. Gage, 21, Club Arcade, Durban is the Natal agent. We would advise those desirous of going more fully into the matter of price, etc., to write to Mr. Gage, who will doubtless be able to supply all information.

Remedy for Scale.

Writing under date of November 2nd from Victoria, British Columbia, Mr. Justice Campbell draws attention to the following excerpt coming under his notice as "A Simple Remedy for Scale":—"Among the means adopted to clear the scale from citrus orchard is one which is said to have successfully cleared a badly-infested plantation in Montserrat, the West Indian Island 'where the limes come from.' Four or five Bengal beans (*Mucuna pruriens*) are planted round each tree during the first rains. These completely cover the trees with their vines. When the beans are ripe the stems are cut and the vines left on the trees." Mr. Campbell concludes his letter with the remark: "I am immensely impressed with the faith the Canadians have in themselves and their country."

The Tick-Bird.

A Bill "to authorise the suspension of Act No. 33, 1896, in regard to the tick-bird" is being introduced into Parliament during the current Session. The Bill consists of one clause only, as follows:—"The Governor may from time to time by proclamation suspend the operation of Law No. 33, 1896, in regard to the bird known as the tick bird (red beak) or *ihlalanyati*. Such proclamation may extend to the whole of the Colony or to any special part or parts, and may be revoked by a like proclamation." The Act referred to—No. 33 of 1896—prohibits the killing and taking of certain birds, among which is the tick-bird; and the Bill which it is now proposed to introduce is an outcome of a theory which is now very generally held in the Colony, and which appears to be very well founded, namely, that the tick-bird is to be reckoned among the causes responsible for the spread of epizootic lymphangitis. From an infected animal the bird flies to a healthy animal, carrying on its beak pus containing the germ of the disease, which germs, introduced through the hide of the clean animal, rapidly multiply and the animal is stricken down with the disease.

Lucerne Tylenchus.

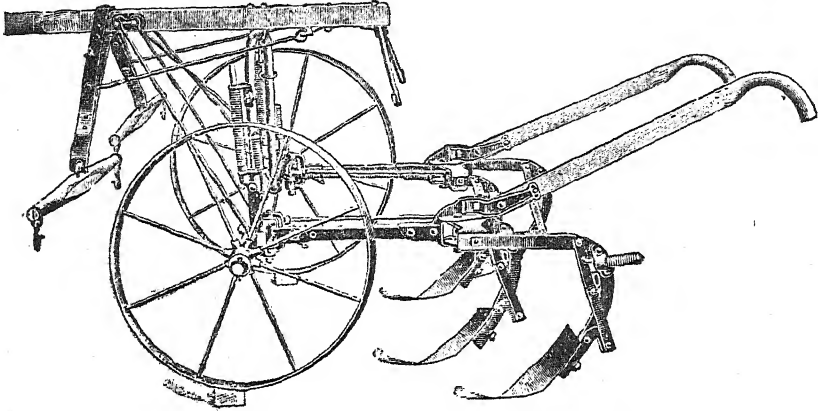
Attention is particularly drawn to the article appearing in this issue of the *Journal* entitled *Lucerne Tylenchus*, which has been taken over from the *Cape Agricultural Journal* of October last. Lucerne growers will be assisting themselves and the Department of Agriculture if they will submit any suspicious examples of diseased lucerne for examination by the Government Entomologist. Packets containing specimens may always be sent post free addressed to the Government Entomologist, Department of Agriculture, Pietermaritzburg. Such packets should be superscribed "O.H.M.S." and marked "Specimens Only" in the bottom left hand corner, under which endorsement should appear the name of the sender.

Farm Implement Demonstration.

In a recent issue of the *Journal* we published an "interview" which our Travelling Commissioner had had with Mr. C. E. Moore, the farm machinery expert of the Moline Plow Co. of the United States (represented locally by Messrs. Malcomess & Co., Ltd.), who has been engaged in giving a series of farm implement demonstrations in Natal. We have now received from Mr. F. Hamm, of Estcourt, two photographs which he took recently at a demonstration of Messrs. Malcomess & Co.'s implements given recently by Mr. Moore on Mr. A. Steyn's farm at Estcourt. We reproduce these photos in the present issue of the *Journal* as they will interest many of our readers. The first photo shows Messrs. Malcomess and Co.'s well-known "South African Chief" disc plough at work, fitted with four discs; whilst the second picture shows the same implement converted into a three-furrow plough, an operation which can readily be made in a few minutes.

Upon receipt of the photos from Mr. Hamm we wrote to Messrs. Malcomess & Co. for particulars of the demonstration, and in the course of his reply the manager wrote: "At this demonstration we exhibited not only the 'South African Chief' plough above mentioned, but also a full range of our other ploughs and cultivators, etc., such as the 'Blue Bird' single-furrow plough, the 'Canadian Chief' two-furrow plough, the 'Champion' planter, the 'Golden Rule' cultivator, and the 'New Western' cultivator, etc." Messrs. Malcomess & Co. went on to say that this last is a new form of up-to-date maize cultivator, and they very kindly sent us a block illustrating it, as well as descriptive matter, as they think it will interest readers of the *Journal*. They consider that the "New Western" is the best for Natal use owing to the fact that it is fitted with an adjustable arch which enables the implement to be regulated for working between rows of different widths. The cultivator is fitted with six best quality hard steel shovels.

"The parallel gang movement," Messrs. Malcomess & Co. proceed, "is a very valuable feature on this implement, as by this adjustment the shovels continue to work in a straight plane facing the direction in which the implement is travelling, even when it is necessary to shift the gangs



to the right or left when operating in crooked rows. Without this adjustment the shovels, of course, also turn with the gang so that they no longer continue to work straight but are facing to the right or left as the gang may be moved. The great advantage of this adjustment in ensuring the best work being done will be obvious to you." We give herewith an illustration of this implement. The price of the machine is £1. The implement is fitted with wheels with extra wide tyres and long-distance dust-proof hubs.

Sugar Interests.

Mr. Geo. Burgess, the Secretary of the Natal Sugar Association, writes us as follows, under date 4th December:—"For some years the need has been felt of an association which would bring sugar planters and their clients together for the consideration of matters affecting their common interests. A conference has accordingly been held of planters, mill-owners, and merchants concerned in the sugar trade, and has resulted in the formation of the Natal Sugar Association, of which Mr. John Kirkman, M.L.A., a planter and mill-owner, is President, and Mr. Jas. McBride, Chairman of the Durban Chamber of Commerce, is Vice-President. Amongst the duties which the Association proposes to discharge is that of collecting and disseminating from time to time information regarding the state of the cane fields and estimates of the seasons' tonnages, so that both planters and the trade generally may have a better knowledge of market conditions than hitherto.

"Crushing for the present season is not yet finished and several of the mills are still at work. From this date to the end of the season a considerable quantity of Natal sugar—estimated at 25,000 tons—will be available."

than that during the corresponding period of last year—will go to market. As regards next season, looking to the larger fields of ratoon crops and the larger acreage of cane, the mills will be compelled to begin crushing operations earlier than has been usual. Some of the large mills have arranged to begin work in April, and deliveries of sugar may therefore be expected in May. As soon as estimates of the next crop can be made with reasonable accuracy the Association will prepare and publish them.”

Introduction of Timber, etc., in O.R.C.

A Proclamation has been issued by the Authorities of the Orange River Colony, amending O.R.C. Proclamation No. 41 of 1909, dealing with the introduction of firewood, brushwood, timber, grass and grass hay from Natal to the O.R.C. across the O.R.C. Border. The new Proclamation provides:—1. From and after the promulgation of this Proclamation, the introduction of any of the articles hereinafter mentioned into this Colony from the Colony of Natal shall be subject to the following prohibitions and provisions:—(1) The introduction of the following articles is absolutely prohibited, *viz.*, (a) Mealie stalks, leaves and cob husks; (b) Kafir corn stalks, leaves and heads; (c) Sugar cane or any parts thereof; (d) Brushwood; (e) Grass or grass hay or any articles packed in grass. (2) The introduction of any timber or wood, including firewood, is absolutely prohibited, except as hereinafter provided, *viz.*: (a) Newly manufactured timber, vehicles (except Scotch carts and wagons which have been in use), and bamboo whipsticks may be introduced without restriction; (b) Scotch carts and wagons (which have been in use) may only be introduced if, before crossing the border, they are thoroughly sprayed with a solution made by dissolving one pound of arsenite of soda in twenty gallons of water, under the supervision of a member of the O.R.C. Border Guard; (c) Barked wattle poles (including those intended for firewood) or other barked poles and second-hand manufactured timber which has been used in the construction of any building or article may be introduced if accompanied by a certificate in the form set forth in Schedule “A,” signed by a Justice of the Peace or Stock Inspector of the Colony of Natal or a member of the Natal Border Guard of this Colony and bearing date not more than seven days previous to that of the said introduction. (3) Lucerne or lucerne hay, or any other forage crop, though containing an admixture of grass or of grass hay may be introduced if it appears to the satisfaction of the Customs Officer, member of the O.R.C. Police or of the Natal Border Guard at the place of entry that the said lucerne or forage crop was grown in enclosed lands on which no cattle have been depastured and that grass has been cut together with the lucerne or other forage crop.

2. Any person introducing or attempting to introduce (the Proclamation continues), whether as principal, agent or servant, by himself or another, any article into this Colony in contravention of any of the above provisions, shall be liable to a penalty not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for a period not exceeding six months. _____

The schedule referred to is as follows:—"I hereby certify that the undermentioned articles have been disinfected by being dipped in or thoroughly sprayed with a solution made by dissolving one pound of arsenite of soda in twenty gallons of water.—*Description of timber or vehicles*; *Date*; *Signed* (*Justice of the Peace or Stock Inspector of the Colony of Natal or Member of Natal Border Guard of O.R.C.*) *Address*."

Alcohol from Bananas

Coast fruit growers will doubtless be interested to learn that a new use has been discovered for bananas. According to *Agricultural News* (Barbadoes) the question of the production of alcohol from these fruit is dealt with by a writer in a recent issue of the *Journal d'Agriculture Tropicale*. The subject is introduced by a consideration of the fact that, in countries that produce bananas for export, a large quantity of the fruit is rejected as being unfit for shipment, and is consequently often wasted completely. Information furnished by the Agricultural Society in Jamaica, and by growers in Guatemala, shows that the loss from such fruit is about 20 per cent. of the crop; this, in the case of Jamaica, is equivalent to two million bunches a year. In view of this, various means have been tried for the purpose of utilising the waste material. Among these have been the drying and preservation of the fruits, and the production of banana flour from it. None of them have, however, sufficed to deal with the quantity of unexportable fruits that have been produced, and it has become necessary to seek for other methods for the disposal of it.

Experiments conducted at the Central Laboratory of Guatemala, in association with the director of a distillery at Puerto Barralos, Guatemala, led to the production of a very good spirit, which is said to be something like whisky, from bananas which were about to be thrown away. Samples of this spirit were reported at the St. Louis Exhibition to be of superior quality, and, after analysis in the Laboratories of the United States Department of Agriculture, the manufacturers were awarded a gold medal. The yield of spirit is estimated at 4½ litres (about 1 gallon) from each bunch of bananas. As regards the cost of manufacture, this is said to be much less than that of whisky, and two years' working of a plant for the production of the spirit showed that the manufacture can be carried on profitably.

Horsesickness Investigation.

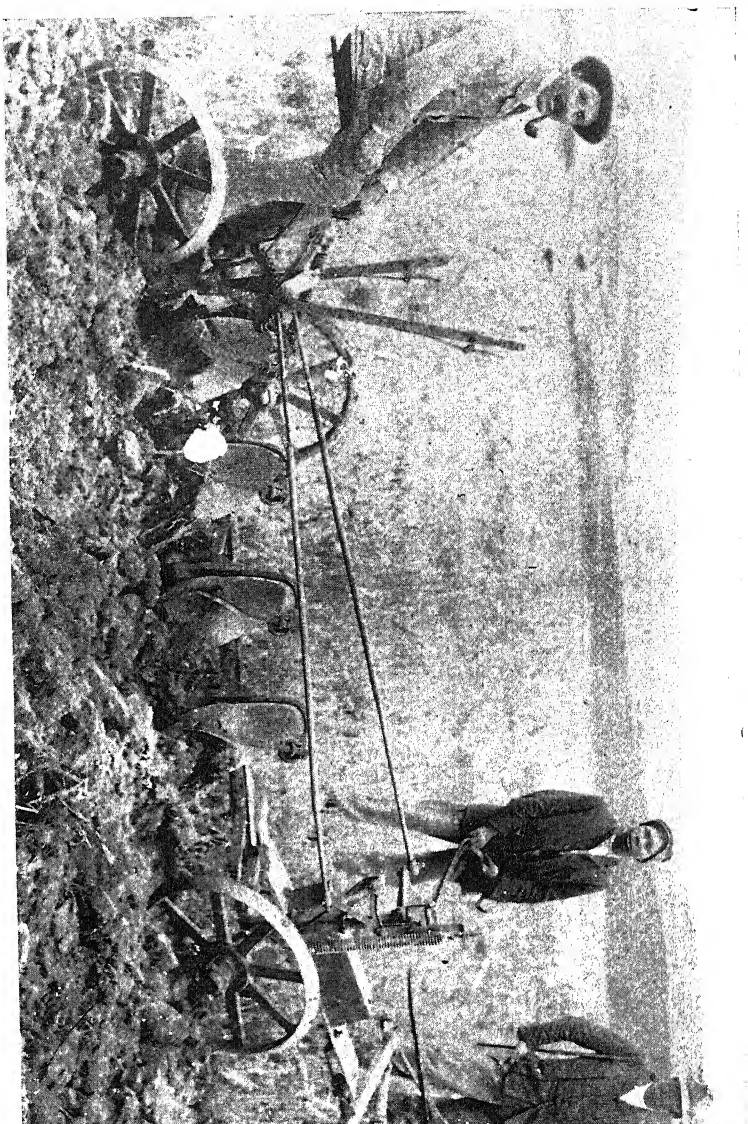
A further progress report on Horsesickness investigation work has been forwarded to the Minister of Agriculture by the Government Bacteriologist (Mr. H. Watkins-Pitchford). Mr. Pitchford writes:—As you will remember, the results of the practical trials of last season gave reason to believe that the immunity of the horse to this disease could be considerably strengthened by the adoption of measures of inoculation with a vaccine by means of which a mild form of the disease was produced. The numbers of horses which had been subjected to this process, however, were so small that it was thought better to apply the system on more ample lines during the present sickly season. Accordingly, arrangements were made for the inoculation of half the horses of the Zululand Mounted Rifles; this Regiment being chosen as affording a better test as to the efficacy of the process than other mounted units situated in more healthy parts. By the hearty co-operation of the Regimental authorities in Zululand, this arrangement has been satisfactorily carried into effect, and 16 horses throughout the Province have been passed through a mild form of the disease without any fatality occurring. This latter result has been more satisfactory than I had anticipated, and is attributable to the careful manner in which directions and precautions were carried out on the part of all ranks. To every man volunteering his horse for inoculation a clinical thermometer was issued, the recipient being instructed in its use where necessary. In this manner it was possible to observe closely the reactions occurring as a result of the inoculation. These results are given briefly in the subjoined report from the Veterinary Assistant (Mr. Matthews) employed upon this service. A second inoculation was carried out at a later date upon part of the horses previously treated, in order to determine the re-inforcing effect of a repetition of the process, a principle which the observation of previous years seemed to render expedient. As was expected, no reactions have been reported as attending these latter inoculations, which were performed upon half the animals previously treated. About eighty horses belonging to the Regiment are thus left in the various districts uninoculated, these animals in many cases occupying the same stables as inoculated ones—so that, in this manner, a satisfactory proof of the utility of the system will be forthcoming at the end of the coming sickly season.

I cannot venture to hope (Mr. Pitchford continues) that the process through which these horses have been passed will afford sufficient immunity to avert death in all cases of those animals which may be attacked. I am sanguine, however, that the horses which have been safely passed through an attack of undoubted Horsesickness, will possess a greater degree of resistance than animals not so treated, so that I

confidently hope for a considerable reduction of mortality. My thanks are due to yourself and the Commandant-General, Militia—to whom I am forwarding a copy of this report—for the facilities which this test has been afforded, and I also wish to express my acknowledgments to the Officer Commanding the Zululand Mounted Rifles, and his Regimental Authorities, for the careful and willing manner in which my suggestions have been carried into effect.

Mr. R. C. Matthews' report referred to follows:—About half the horses of the regiment (Mr. Matthews says) have been inoculated, seventy-six having been injected, and of this number about half (37) have been re-inoculated a second time one month after the first inoculation. The results of the first inoculation are as follows:—No death has occurred in the total number, and in only a few instances a swelling of the head or loss of appetite has been reported. The reactions to the inoculations have been in most cases well marked. Records were kept by the men of all temperatures, and copies of these reactions were in most instances returned to me by the men, having been properly kept, while fifteen failed to return a record of their horse's temperature. From the fifty-eight (58) charts returned, which I have already sent you, it will be seen that 75 per cent. of the horses have reacted, and 25 per cent. show little or no reaction to the inoculation. Thirty-one (31) of the fifty-eight have reacted vigorously (that is have had temperature curves of 104 degrees or over), while twelve (12) have shown distinct reaction, but to a less degree (102 to 104), while about fifteen (15) show little or no disturbance, the majority of such non-reactors being resident in Amatikulu or Ginginhlovu districts. The reaction sets in about the fifth day on the average, and continues until about the twelfth. With regard to the second inoculations, which commenced on the 8th instant, no reactions have been reported, which was what was expected, although one or two swellings have occurred at Umhlatusi from a cause which I could not ascertain. Such swellings, however, were trivial.

The general results (Mr. Matthews concludes) may, therefore, be summed up as follows:—No owner has reported any apparent inconvenience to the horse subsequent to the inoculation beyond lessened or loss of appetite lasting for two or three days during the height of the reaction, while others have reported slight swellings at the seat of inoculations (all of which have subsequently subsided), while again a small percentage of owners reported the occurrence of swelling above the eyes (walnut size) lasting only a short period. I shall be keeping these horses under observation during the coming summer, and shall report to you again with reference to the extent of immunity which this mild attack of Horsesickness has produced.



PLOUGHING DEMONSTRATION AT ESTCOURT.—1.

Messrs. Malcomess & Co.'s "South African Chief" Disc Plough at work: fitted with four furrows.

(See "*Notes and Comments.*")

The Living Bee.

By MARY RITCHIE,

*President, Natal Bee-Keepers' Association, Natal Expert, South
African Bee-Keepers' Association.*

Continued from Page 610.

III.—THE HIVE.

BEES, like humans, have passed through many phases in their domestic architecture. From cave dwellings, hollow trees and skeps of humble thatch they have come through a long succession of different hives to the elaborate gable-roofed, portico-entranced and sometimes glass-fronted residences in which we find them to-day.

The newest of new hives is the Danzenbaker, designed by Francis Danzenbaker, and first sold in 1895. As a comb-honey hive it won first prize at the Paris Exposition in 1900 and at the Pan-American Exposition in 1901, and since then it has continued to come into favour with bee-keepers all over the world—not on account of its elaborateness, however, but on account of its simplicity. It is so simple in construction that it is difficult to realise the long series of steps that have led up one by one to its invention.

The first essential of a hive, as of any home, is shelter—warmth. Without warmth bees cannot build their combs. When swarming bees settle on a branch they always gather in a round cluster, in what looks a solid, brown velvety mass. But the cluster is not so solid as it appears; inside the bees are in loose festoons, and all around this and keeping them warm is a close layer of bees, forming, in fact, a temporary hive. Sometimes in tropical countries or under certain circumstances (the neighbour's eight day clock or jam cupboard being unexpectedly locked) the bees will continue to hang on the tree and actually build their combs and establish their home in the open sunlight. If instead of this outside circle of warming bees we substitute a cover of straw or wood more bees are set free to build wax. The old-fashioned straw skep was circular in shape and just the size of the cluster and the sheets of comb were built from the roof. This style of hive was in common use till fifty or sixty years ago.

It was in 1835 that the first step was taken towards the invention of the movable frame. Dr. Dzierzon, like other bee-keepers of his time, used wooden boxes piled one above another, but he saw the necessity for a removable straw cover for winter, and in order that this cover might

be lifted off without injury to the comb he put on as many inch wide bars, spaced a finger breadth apart, as were sufficient to cover the hive. This done and the bees having built regularly to these bars, he was able easily to remove the cover.

In 1852 Langstroth—the father of American bee-keeping—conceived the idea of surrounding each comb with a frame of wood, entirely detached from the walls of the hive, leaving at all parts, except the joints of support, space enough between the frame and the hive for the passage of the bees, and thus it was possible to remove not only the cover but each individual comb, and the invention of the movable frame hive was complete. Danzenbaker hives are sold in crates of five, and nothing is more delightful than to open one of these, exposing the snow white and beautifully cut bass-wood boards, that fit together like a box of puzzle bricks. The days are all too short for the joy of discovering how they go.

To nail together hive-bodies and supers is easy enough. To get them *true* measure diagonally with a rod until the length between opposite corners comes the same. After putting together they must be painted, and here again a cast-iron back with a hinge in it is very useful. We need not, of course, pause to paint figures and landscapes on the fronts of the hives as their owners did in the leisurely days of long ago. Besides brood-boxes, the brood-frames, section racks and sections have to be put together—light, easy joinery.

The only difficulty usually experienced is with the gable cover. The two upper boards are first nailed to the centre ridge piece and project over the body box so that the rain will run off. By nailing the under boards an inch apart an air-space is secured, and I have seen many roofs put up in this way. In theory it is excellent, but in practice it has two or three decided drawbacks. It worries the bees, and they keep exploring the recesses of the roof instead of attending to business. The queen may go into the roof when the bees are smoked (the under side of a cover is a not uncommon place to find a queen), and, lastly, robber bees soon discover that the air-space leads in to the interior of the hive and the inmates may have hard work to defend themselves. These difficulties could be met by using quilts, but on the whole a roof with the under boards according to the makers' instructions is best. In putting the cleats in the frames an empty reel or a hole in the work bench is useful and keeps the wood from splitting. In fixing foundation in the frames note that the wedge has a right way and a wrong. The bevelled side goes next to the wax.

In the mist belt the ordinary Danz alighting board is a death-trap to many bees as the moisture collects on it and drowns them. This can be remedied by making saw-cuts or grooves or by sprinkling sand on them before painting, or dispensing with the alighting board altogether.

IV.—HOW TO DRESS AND USE THE SMOKER.

A clean starched dress or suit of light colour is best. If starched it is impervious to stings and bees will not settle on light cloth as they will on dark. Fingerless gloves or long-sleeved mitts are comfortable. They leave the fingers free and prevent bees from crawling in at the wrist to their own sorrow and that of the wearer. Indiarubber suits are quite unnecessary! Always wear a veil and *take time to adjust it properly*. To have a bee in one's bonnet is nothing compared to having one in one's bee-veil.

A good reliable smoker is a necessity; a poor smoker is an utter weariness and vexation of spirit. There is the smoker, for instance, with the thin door that always twists and never shuts after the first time. From this the smoke issues from the back and bids fair to suffocate the bee-keeper, while the bees buzz mockingly about the mouth-piece. There is the smoker with the top so simple it is not even hinged. You simply squash it down, clasping it firmly with both hands, easy on the counter no doubt, but another matter when alight: or the smokers, and their name is legion, that go out just at the critical moment, without fail. The twentieth century Danzenbaker has no evil ways: it is a smoker that can be trusted, always ready for action. Be careful not to lay it against the clothing, and be *sure* to extinguish it before bringing it indoors.

The first lesson in bee-keeping is to learn the use of the smoker.

Cotton rags or cotton waste from a machine shop or engine room make excellent fuel. Old sacking soaked in a weak solution of saltpetre does very well. The smoke should be given in puffs, a little at a time and very little at first. Do not smoke continuously but give a few puffs, then wait till the pollen-laden workers have passed in. Never open a hive during its playspell any more than you would stay in a house during spring cleaning unless you mean to help. The workers are much too busy to be worried with you. Be careful, too, how you smoke bees off uncapped frames. Nobody fancies honey that tastes like haddock!

I have heard of several beginners lately who, finding their bees so much more docile than they expected, went to remove the honey without giving smoke. They had bought expensive smokers it is true, but they had made the discovery that really the bees did not need it! But a colony with much brood and much honey is a very different thing to deal with compared to a tiny cluster; in fact, I think the stronger the colony the more reckless they become.

A little smoke does no harm, indeed it is kinder to the bees, as it quiets them at once and prevents them from getting in an uproar. The correct method of giving smoke comes by practice. Don't blow it in

their eyes and blind the poor little bees, do it gently, just sufficient to hurry them to the uncapped honey cells. Maeterlinck's explanation is that, scenting danger, each bee fills itself with honey in case the whole colony may have to swarm and supplies be needed. Don't forget the returning bees with their heavy loads and keep them from alighting by a cloud as dense as a London fog, puff a little, wait till the returning bees enter and puff again.

V.—THE INMATES

"The eye only sees what it brings with it the power of seeing."

Though there is no need for us to follow the long and toilsome methods of earlier bee-keepers, it is important that we become familiar with their observations and discoveries, in order that, with seeing eyes, we may approach the mysteries of the hive.

With regard to the inmates. We know that there are three kinds of bees, and we look for workers, queen and drones. The bulk of the bees are the worker bees—perhaps 30,000 strong about 300 drones and one queen. The queen is the mother, the drones the brothers, the workers the busy sisters of the hive.

The queen mother is very beautiful—very wonderful. That the bees pay her great attention is easily seen in an observatory hive. In fact they rather worry her on hot days just as children climb on the back of their mother's chair and do her hair and play with her brooch when she is trying, it may be, to have an afternoon nap.

The queen is shy of the light and unless carefully looked for is seldom seen; the drones hurry to escape from the hive at the first breath of smoke and being easily seen are not infrequently mistaken for her majesty. But once the queen has been observed the mistake will never occur a second time. She is a long slender creature, her body tapering gracefully to a point. I remember once a Kafir boy assuring me he knew a queen and could detect her amid a crowd of swarming bees. What was my astonishment a few minutes later to see at least a dozen inverted tumblers on the ground, a loudly buzzing captive drone in each!

The drones are fine burly fellows, proverbially idle. They take a short flight in the middle of the day but are always home in time for dinner. If it is not provided in the centre of the hive above the brood they are equally happy exploring the pantries at the sides and always with an exceedingly possessive air as if the place belonged to them. Their loud buzzing is a part of the life of the hive, their presence a sign of its prosperity.

On the workers devolve all the manifold labours of the hive. It is they who build the city and sustain it, who collect the pollen and the

honey, who nurse the larvæ and provide food for all. We have no record as yet of the lifetime of a bee in this country. It is put down as six weeks in the bee-books, but I am sure it is longer in South Africa.

VI.—BROOD FRAMES.

The first part of the hive to be understood is the body-box or brood nest with its ten movable frames. Between these are the streets of the bee city all running parallel to each other, in which multitudinous workers hurry to and fro.

Smoke not continuously but, as I have said, a few puffs at a time for a minute or two at the entrance of the hive, then gently lift the cover. If the hive is an old one this is easier said than done, for the bees object to ill-fitting roofs and spend much labour in fixing them securely. This is sometimes a source of astonishment to beginners. I remember thinking my bees had sealed their roof against my second visit!

The bee-glue or propolis which they use for this purpose is the sticky, resinous substance with which the tiny leaf-buds are water-proofed in the spring. The bees collect it in their baskets much as they do pollen, and plaster up the cracks and crevices of their hive till not a slit is left big enough to let in a sunbeam, far less a raindrop. So unnecessary we think that they should fill up these little spaces, "little spaces" to us perhaps, but "yawning chasms" to them. Each hive part should fit to a nicety in *our* opinion at least: the cleverest mathematician would not be too exact for the *bees*. Modern frames and hives are constructed in such a way as to discourage this accumulation of propolis, but sometimes if the entrance is wider than they like, they build beautiful pillars of propolis through which they pass out and in.

The cover removed, lay it down in front of the entrance and continuous with it, so that the bees may run straight back into the hive without having to take wing. Always work from the back or the side of a hive, never stand in front.

Hold the frame that is being examined just above the hive to avoid losing the queen, but do not be disappointed if you do not see her the first two or three times. If there is uncapped brood in the hive it means that she is there all right. I find the afternoon sunshine the best for revealing queens, when the sunbeams are aslant and fall on the side of the comb. The frames may be looked at in turn, but should be replaced exactly in the same position as they were.

In Shakespeare's day wax was supposed to be gathered from the flowers. "Since I nor wax nor honey can bring home," but since then it has been observed that wax is exuded from the bodies of the bees in minute white flakes, but how these flakes are passed from one to another

and wrought into the honeycomb, it is difficult to understand. Richard Jeffries says "the bees join hands, silence descends, and the mystic rite is begun."

Lifting out a frame we find the bees suspended from the top bar and hanging in wonderful festoons in the space the comb they are making is to fill. If the frames are lifted gently the bees will continue hanging a living veil of bees, much to the astonishment of the beginner who is certain sure that they will break their legs.

The comb is begun in tiny tongue-shaped pieces in two or three places at once. These are afterwards joined, but so cunningly it is impossible to believe it has not been built all in one piece. Warm weather, a strong force of bees, a good honey flow, or, failing this, artificial feeding, are essential to the production of wax.

Much has been written about the mathematical accuracy and wonderfulness of the honeycomb with its delicate hexagonal cells, but every new piece of comb will ever call forth fresh admiration on account of its snowy whiteness and exquisite workmanship. The comb after it has been used for brood-rearing becomes discoloured but when new it is fair and beautiful.

A word of warning. Great care must be taken in lifting out frames of freshly built comb for the wax is fragile in the extreme. They must be kept perfectly upright, otherwise the comb, if allowed to swing to one side, will readily break.

VII.—BEE-BROOD.

We watch the bees in the garden searching for pollen and honey in the flowers, collecting propolis it may be from the buds, but the real pleasure for us curious mortals is to see "the wheels go round," to peep inside the hive and watch with bated breath the teeming life within.

Choosing a fine settled day we open the hives for a further study of the brood nest. The heat has enabled the bees to mould the softened wax into exquisitely delicate sheets of comb, pure white at first but soon changing to a bright yellow. These are the waxen cradles for the bees. The drones cells are larger than the worker by about a third, the worker cells being about twenty-seven to the square inch, the drones numbering eighteen to the same area. In comb-building, however, they often pass from one size to the other in one piece of comb, while the proportion of each varies very much in different hives.

If the frame is turned to the light so that the sun shines into the cells, we can see the eggs—tiny white strokes—where they have been deposited by the queen, one at the bottom of each cell. Some have hatched into tiny worm-like larvæ—little white commas—and these are being carefully tended and fed by the young worker bees. This is

known as unsealed brood. The cells of those that are more than six days old have been sealed over by a porous waxen lid; this is known as sealed brood. The cappings of the worker cells are almost smooth, the cappings of the drones are distinctly convex, and have been compared to a row of bullets laid close together on a board.

The queen bee has laid first in the middle of the cluster, continued in a circle round the first egg laid until most of the warm space has been filled. She had then crossed over to the next comb and done the same thing, thus we find the eggs in the central part of the comb, and in the frames situated in the centre of the hive. The drone comb comes next, and furthest from the centre are the frames of stores—pollen and honey.

Lifting a brood frame we find that in each of the thousand vacant cells the queen has laid an egg, a tiny thing indeed, but tiny things will grow, and in three days it develops into the hungriest of little grubs that eats and eats all that the nurse bees give it. On the eighth day the nurse bees feed it for the last time and seal it up as though saying "there, that's your last meal, lie quiet now and go to sleep," so for two days it spins itself a silken coverlet and lies for three days more quite still beneath. Hidden from our eyes strange things occur, the soft, white grub becomes an insect's frame; limbs, head and eyes take shape and wondrous wings appear, while after seven more days—some twenty-one in all—it is born a baby bee.

Just alongside but in a larger cell the queen has laid a different egg, but one which, except for a difference in time, develops in a similar way. The nurse bees feed it for one day longer, it takes one day more to weave its coverlet, for one day longer it lies asleep, and on the twenty-fourth it issues a baby drone.

UNSEALED BROOD.

"When just hatched the larva lies curved in the bottom of the cell a straight line from head to tail, being little more than one-fifth as long as the diameter of the cell. At one day old it is still in the form of a semi-circle, but has grown so that the line from head to tail is a little more than one-third the diameter of the cell. At two days old it lies head touching tail, forming a complete circle whose diameter is nearly half the diameter of the cell. At three days old it occupies five-sevenths of cell diameter. At four days old it fills the entire diameter of the cell."

—Dr. E. F. Phillips.

VIII.—STINGS.

But bees have stings—red-hot swords. Bee-keeping would be tame if they had not. The sting introduces an element of risk, a need to be on the alert, an uncertainty as to what will happen next, and last of all an opportunity of being brave. The first shock of pain is usually followed by a feeling of utter astonishment that one small creature can contain so much venom in its soft little body—what if it were as big as an elephant and venomous in proportion!

The bee-books say that the sting has two spears, and each has nine barbs. It is rude to contradict, but we have always found them ninety. These fine barbs prevent this miniature harpoon from being easily withdrawn. The first spear darts into the flesh, the other follows, and they penetrate deeper and deeper to the depths of one-twelfth of an inch the bee-books say; but the pain travels further—much!

It is also stated that when boiled in water the sting becomes tender and easily crushed. This is interesting information, perhaps, but poor consolation.

The first thing to do on being stung is to remove the sting. Even Mr. Dick, had Betsy Trotwood asked him, would have agreed with us on this point. Remove the sting first before running away. But how? Not between the finger and thumb but by wiping it off and that instantly before much of the poison can enter the flesh. When the bee leaves its sting it leaves the poison sac as well and the muscles that control it. The longer the sting remains the deeper it penetrates, injecting more and more poison into the wound. The smoker should be turned on the place at once as the scent of the poison is very strong and incites others to sting. The wound should not be sucked on any account; the poison is said to act with greater powers on the organs of digestion, and distressing headaches may result for which the hot sun and not the bee-stings are usually blamed. Nor should the wound be rubbed on any account. To keep from doing so is very difficult, but of course this only spreads the poison and aggravates the wound. Mr. Roof's advice is the best—*forget about it as quickly as possible.*

Better still is to know how to avoid. Go quietly, work calmly, and, if a beginner, slowly; as fast as you like afterwards, but always without flurry. Work calmly, quietly and *fearlessly*. To shrink from a dog is to encourage it to bite you, to feel afraid is to be stung.

(To be continued.)

Horses will eat carrots whole, but it is better to slice them, as they are then eaten more promptly and with less waste. The value of carrots lies not in their nutritive materials, but in the cooling, laxative, healthful effect on the digestive system, making the horse thrive and his coat shine. A comparatively small amount of carrots is enough, 8 to 10 lb. daily per horse being the usual ration. Large amounts add nothing to the beneficial effect on the system.

Farming Implements and Machinery.

WHAT THE NATAL FARMER HAS TO CHOOSE FROM.

By H. J. CHOLES.

THE modern tendency in all industry is towards the saving of labour by the use of increasingly efficient forms of machinery; machinery has, in fact, effected a revolution in the industrial world, for not only does its use enlarge the output of industry but also in most cases that output is improved in the quality of its workmanship.

For the farmer the introduction of machinery of increasing efficiency has proved an inestimable boon. In modern farming the end to be aimed at is the securing of as large a monetary return as possible from each acre farmed, and the attainment of this end is very materially assisted by the employment of machinery which will save time and labour and which will at the same time secure greater efficiency as regards the work done. For instance, to possess a plough, purely and simply is not in itself sufficient: the plough must answer certain requirements; it must turn the furrows in the best way according to its owner's ideas of ploughing; it must admit of easy adjustment to the conditions of the moment; it must be suited to the draught power available; it must, in the number of furrows it turns at once, bear some relation to the area to be ploughed for a given crop or in a given season; it must be suited to the condition of the land to be turned; and its price must not only suit its owner's pocket but it must be such as to yield a reasonable interest measurable in the mechanical value of the plough from the working, labour saving, and time saving points of view. The same principles apply to other forms of farm machinery: the mechanical value of the implement must bear an equitable relation to the price of the machine, and the price, again, must be proportionate in some degree to the scale upon which the operations of the farm are being carried on.

The requirements of the farmer are consequently very varied, but even more varied are the numerous types and makes of machines, old and new, that are now to be found on the market. Some old machines whose qualities have had to give place to the superior excellencies of modern machines are still being sold, while at the same time there are old machines that still hold their own amid the competition of modern inventors. There are machines whose price is out of proportion to the value of the work they perform and to their construction, whilst there are others that may be considered bargains from their cheapness. There

are machines of various sizes, and of various power. What is the farmer to purchase? Shall it be this machine or shall it be that? Can I afford to give so much for this machine? Is the work it is likely to perform worth it? Has its construction any advantages over some of the cheaper machines? Such questions the farmer must ask himself, as he contemplates the purchase of new machinery whether it be a plough, a planter, a harvester or any other implement. They are questions which require careful thinking over; and even when the farmer has made his purchase, he is not sure that he might not have got a better machine elsewhere.

The difficulties which confront the farmer who sets out to buy a new implement are thus evident. He has many things to think of, and the chances are that, if he lacks sufficient experience, he will be "bitten," and suffer considerable loss through his want of experience. To meet this difficulty in choosing implements and to offer a reliable guide to the various farming machinery which is at present on the Natal market, I have undertaken the preparation of a series of articles of a practical nature embodying the results of investigations which I have been making among the various machinery firms of this Colony. In order that these articles might be suited to the needs of the farmer—that is to say, that they might contain just the information that a practical farmer who either wants to purchase machinery at once or wants to compare the implements he already has with those on the market with a view to the substitution of better machines if possible, for his older ones, would find most useful—I approached the largest machinery firms in Natal, and from them I have received assurances of assistance in the preparation of these articles, as well as very material assistance, in the direction of the supply of matter and illustration blocks for the present article.

Whilst I hope to cover practically all the different makes on the Natal market of the various implements and machines used in connection with farming operations, I cannot guarantee that all the articles in this series will be as complete as could have been wished—and I think readers will appreciate the difficulties that must stand in the way of any attempt to prepare an article that will completely cover all the many different kinds of machines that are to be found on the market. At the same time, these articles will be as complete as information gleaned from the resources of Messrs. P. Henwood, Son, Soutter & Co.'s, Malcomess & Co.'s, G. North & Sons, and Steel, Murray & Co.'s establishments can make them—and to mention these four names is to include practically all the firms handling farm machinery in Natal to any appreciable extent;—so that I think I am in a fair position to give perhaps not quite an exhaustive, but at any rate a very comprehensive review of the resources of the farm machinery

market in this Colony. I hope to be able, so far as the exigencies of space permit, to publish an article each month in the *Journal*; and starting, in the present article, with ploughs, I shall proceed to discuss harrows, cleaners and weeders, planting machinery, cultivating machinery, harvesting machinery, threshing machinery, hay-making appliances, dairy appliances, and various forms of machinery designed for special purposes. I propose to publish illustrations of as many of the various implements dealt with as I possibly can, and I shall also, in each case, in order that the articles may be of practical value, indicate the prices of the machines f.o.r. Durban or Maritzburg.

I.—SINGLE-FURROW PLOUGHS.

In considering ploughs, we may conveniently divide our study into four parts, the first dealing with single-furrow mouldboard ploughs, the second with multiple mouldboard ploughs, the third with disc ploughs, and the fourth with special-purpose ploughs.

SINGLE FURROW MOULDBOARD PLOUGHS.

Single furrow ploughs may be broadly divided into two great classes—(1) those having straight steel and wooden beams, and (2) those built with what is described as the “swan-neck” pattern of beam. The former is the older style of plough, but it is one that still holds its own, and has much to recommend it, by reason of the straight construction of its beam, as compared with the newer pattern (which is a product of American engineering). Taking first the swan-neck type, the “Blue Bird” gives us a good general idea of the principle upon which this kind of plough is constructed—an illustration of the plough is

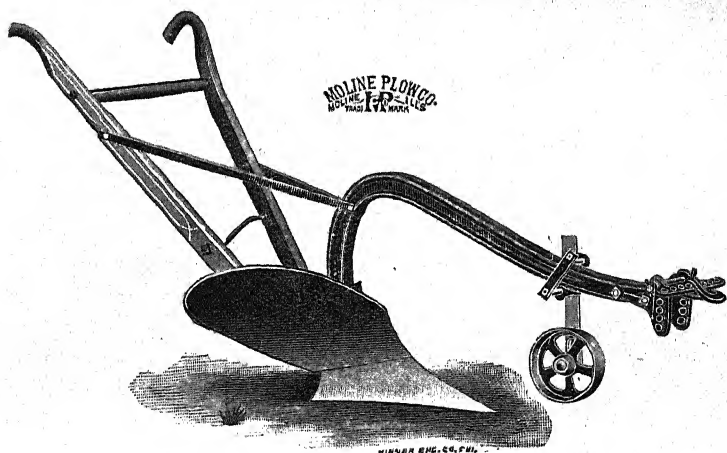


FIG 1.—The “Blue Bird”: A Typical Swan-Neck Plough.

shown in Fig. 1. The "Blue Bird" is, in fact, Messrs. Malcomess and Co.'s principal single-furrow plough and is used in thousands throughout South Africa.

It is a general purpose plough suitable also for breaking up new land. The steel share and soft centre steel mouldboards are built on a heavy braced steel frog or block which constitutes the frame and to which also the steel beam is attached. A gauge wheel for regulating the depth is furnished with each plough. The outside landside is of crucible steel with chilled slip heel which is removable and can be replaced at a very small cost.

This is a useful plough for all-round work, and in most classes of soil can be drawn easily by two or four oxen. It is obtainable in two sizes, 12 in. and 14 in. cut. The list price of the former size is £3 15s. (Durban) and the weight 100 lbs.; and of the 14 in. size, £3 15s. The weight of this latter one is 116 lbs. A rolling coulter can be furnished with the plough, if desired, at an extra cost of 14s., also a double wheel fore carriage at an extra price of 25s.

The construction of the plough bottom and slip heel of the "Blue Bird" is shown in Fig. 2.

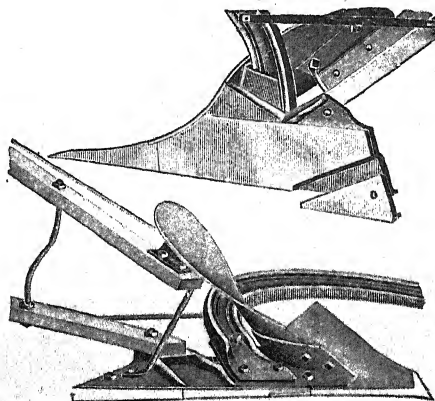


Fig. 2.—Showing Construction of Plough Bottom and Slip Heel of the "Blue Bird."

Very similar in appearance to the "Blue Bird" are Bradley's "African Bird" and "Royal Blue" ploughs—so similar, in fact, that separate illustrations are not warranted. The "African Bird" is made in two sizes, ploughing furrows from 8 to 11 inches, and is suitable for small cultivations or for weeding between the rows of sugar cane and other crops. The "Royal Blue," like the "Blue Bird," is made in two sizes ploughing 12 and 14 inch furrows. This plough is built on a strong steel frog, on which the share, mouldboard and landside rest solidly. To give additional strength it is well braced. The share is reinforced at the point, and this, together with its adjustable heel, serves to add con-

siderably to the life of the plough by counteracting the effects of wear. The mouldboard has a double shin, and is made well shaped, making the plough equally suitable for old and new land. The wheel is practically dustproof. The plough is furnished with either wood or steel handles, as desired. This plough won first prize in the ploughing competition with leading British and American makes. Both these ploughs—the “African Bird” and the “Royal Blue”—are stocked by Messrs. P. Henwood, Son, Soutter & Co., at prices ranging from £1 17s. 6d. to £2 17s. 6d. in the case of the former and from £3 7s. 6d. to £4 2s. 6d. in the case of the latter (both f.o.b. Durban). Extra shares for the “African Bird” run from 5s. 6d. to 6s. 6d. each, and for the “Royal Blue” from 7s. 6d. to 8s.

The Cockshutt “Columbia” Single Furrow (Fig. 3) is another example of the swan-neck type. This implement, which is manufac-

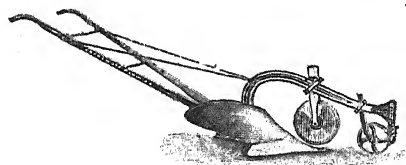


FIG. 3.—The Cockshutt “Columbia” Single-Furrow Plough.

tured by the Cockshutt Plow Co., Ltd., of Canada, can be had with Y 8 in., Y 10 in., Y 12 in., and Y 14 in. cut and is fitted with one or two wheels, and with knife or rolling disc coulter. These ploughs are constructed entirely of steel, including the handles, which are strongly braced. The shares, mouldboards etc., of the Y 12 in. single-furrow will fit the “Columbia” three-furrow 36 in. cut, and also the “Columbia” two-furrow 24 in. cut; whilst the shares, mouldboards, etc., of the Y 14 in. will fit the “Columbia” two-furrow 28 in. cut plough. This, of course, is a great advantage to the farmer, as it means that a farmer possessing one each of the above one, two and three furrow ploughs needs to keep one lot of duplicate parts only. These ploughs are specially recommended by the makers for breaking up new lands, being well and strongly made and of very light draft. The beams are made of high carbon steel, are very high and are suitable for ploughing weedy and trashy lands, since the extra long mouldboard will bury and cover weeds well. The wheels are practically indestructible, as they are now fitted with interchangeable bushes, which can be renewed at a very small cost. Messrs. North & Son are the agents for this plough in Natal and they inform us that it was awarded 1st prize at both the Harrison and Pretoria plough trials against all comers.

The prices of the various sizes of the “Columbian” are as follows

(f.o.r. Durban):—Y 8 in., with one wheel, £2 15s.; steel shares, 8s.; solid cast shares, 2s. 6d. Y 10 in., with one wheel, £3 2s. 6d.; steel shares, 8s.; solid cast shares, 3s. 6d. Y 12 in., with one wheel, £3 12s.; steel shares, 9s. 6d.; cast shares with loose points, 3s. 6d.; solid cast shares, 3s. Y 14 in., with one wheel, £1 14s. 6d.; steel shares, 11s. 6d.; cast shares with loose points, 3s. 6d.; solid cast shares, 3s. Rolling coulter, 15s. 6d. extra.

In Ransomes' "Steel Eagle" R.Y.L. and light steel E.C. ploughs, we find a noteworthy departure from the general method of draught attachment. Instead of the ordinary draught-head, a draught-rod is provided, one end of which is fixed some distance along the beam. A glance at Fig. 4 will show what we mean.

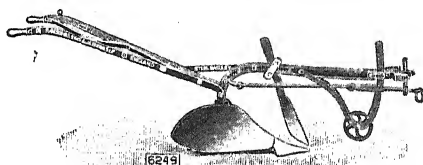


FIG.—4.—Ransomes's "Steel Eagle" R.Y.L.

The R.Y.L. is a new general purpose plough which has been specially designed to meet the requirements of Natal and Cape Colony for breaking up new soil. Among the important improvements which have been embodied in it, mention may be made of the fact that the beam has been strengthened in the bend by the addition of steel plates, and the draught rod (which is connected to about the middle of the beam in the E.C.—which plough we shall discuss directly) has been attached to the strengthened part of the swan neck. The beam has furthermore great clearance underneath, which enables the plough to work in the roughest and most weedy soils without choking. The breast is of the celebrated Y.L. pattern, so largely used in Natal and Cape Colony, and can be had in either cast iron or steel, as preferred. The share is also of the Y.L. pattern, and is generally made of Ransomes' patent chilled metal which is self-sharpening and durable. The plough is shown with one wheel only, but if desired it can be fitted with two front wheels, adjustable for both depth and width. A disc coulter can also be supplied at an extra charge. The plough gives a 12 in. cut, and requires 6 or 8 oxen.

The other plough which Messrs. Ransomes, Ltd., are making of the swan-neck type with the draught attachment extended well back along the beam towards the bend—the E.C.—is another all-round general purpose plough made specially for Natal. This plough is very light in weight but as all parts subjected to great strain are made of the best steel, it is capable of doing almost the same work as some of the heavier

types. It will break up new land on light soils where there are no obstacles such as stones, roots, etc., but is most suitable for ploughing stubble and old lands of a similar character on light and mixed soils. The share, breast and landside are of the best steel and hardened. The "bottoms" to which the beam is attached is also of annealed cast steel, thus rendering breakages almost impossible. The plough can be obtained with either one wheel, two fixed wheels, or a loose fore-carriage.

An interesting type of sulky plough is the "California Good Enough" sulky which is being stocked by Messrs. Malcomess & Co. An illustration of the plough is given herewith (Fig. 5).

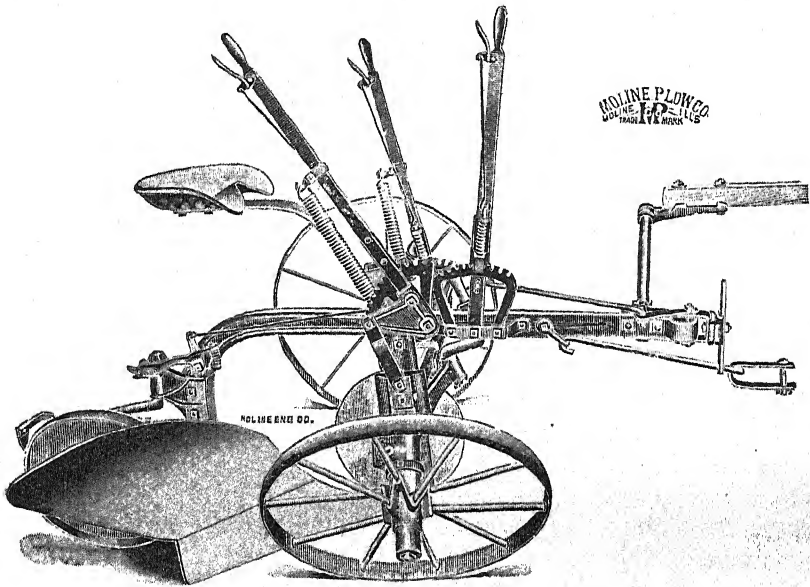


FIG. 5.—The "California Good Enough" Sulky Plough.

This implement is specially designed for heavy work and deep ploughing, and, whilst not so extensively used as the smaller single furrow ploughs, it is in great favour with the more advanced agriculturists. The width of cut can be adjusted from 14 in. to 18 in. and the depth from 16 in. or even 18 in. It is furnished complete with revolving coulter, riding attachment, and steerage lever, as well as improved draught rod attachment. This latter is a useful little appliance, consisting mainly of a wrought iron rod which is attached to the beam of the plough in such a manner that should the implement strike a tree stump or rock, the rod straightens out, thus preventing any undue pressure being put on any part of the plough, thus obviating breakages. The plough is further fitted with oblique pattern furrow wheel which prevents it climbing the side of the furrow. The price of this im-

plement is £9 and the weight 440 lbs. The draught is from 4 to 8 animals, according to the class of soil to be ploughed.

Of hillside ploughs there are several different makes to be had in Natal. Fig. 6 shows the "Wiard," for which Messrs. Malcomess & Co., Ltd., are Natal agents, and which is stocked in various sizes with both "swan" and straight beams. It is a very useful implement for working on sloping land as the whole plough bottom is reversible so that the furrows can always be turned in the same direction no matter in which

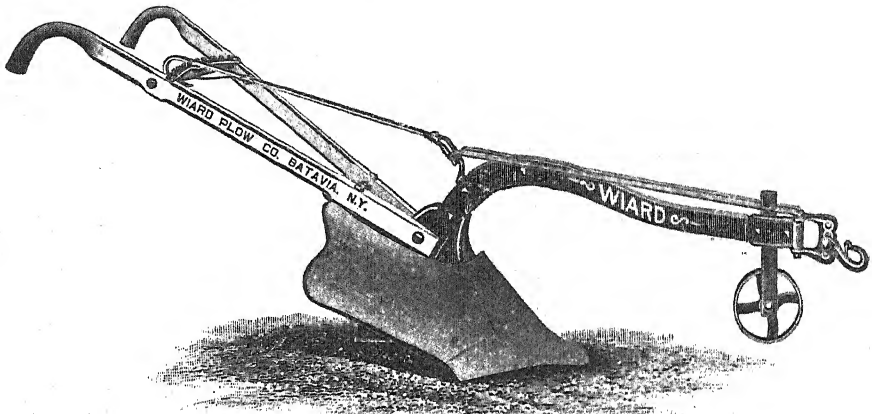
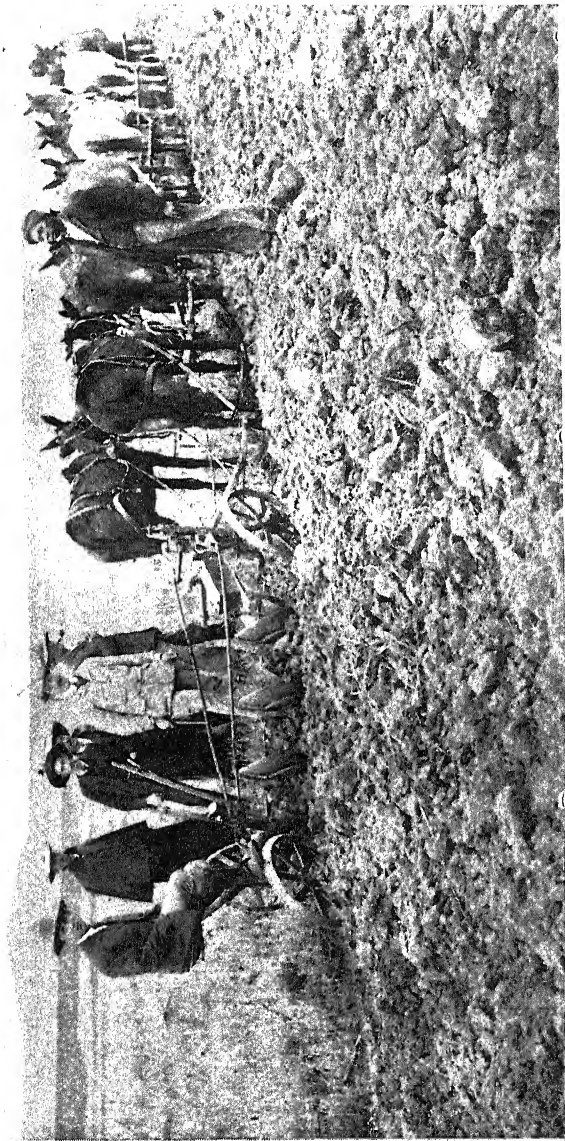


FIG. 6.—The "Wiard" Hillside Plough.

direction the animals are walking. This plough is furnished with a steel share and mouldboard and the steel beam is forged of the split pattern which gives the maximum of strength with minimum weight. The weight of the plough varies according to size from 100 lbs. to 140 lbs., and the price from £2 2s. 6d. to £4, and the draught from one to six animals.

The Cockshutt Plow Co. are now turning out hillside ploughs in three styles (so far as South Africa is concerned), *viz.*: No. 36, with wood beam and handles, 9 in. cut; No. 126, 11 in. cut, strongly made, and with special iron handle brace fitted with bolts and nuts in place of the ordinary wood-bar and iron rod used in other ploughs; and No. 6, an all-iron extra heavy hillside plough, with 12 in. cut. (This last is a great favourite for rough and hilly lands, and is very strongly made with an extra high steel trussed beam. It will work well on hillside or on level land, and is now fitted with special steering gear.) Messrs. North & Sons are stocking these ploughs; and the prices, *f.o.r.* Durban, are as follows:—No. 36, £1 15s. (shares, 1s. 6d.); No. 126, £2 7s. 6d. (shares, 2s. 1d.); No. 6, £3 17s. 6d. (chilled shares, 2s. 3d.; and special rolling coulter, if desired, 18s. 6d.). Fig. 7 illustrates this type of plough—see next page.

Proceeding now to consider straight-beamed ploughs, we find in



PLOUGHING DEMONSTRATION AT ESTCOURT.—II.
The "South African Chief" Disc Plough, fitted with three furrows.
(See "*Notes and Comments*")

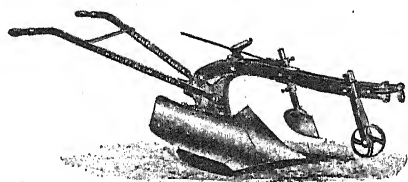


FIG. 7.—The "Cockshutt" Hillside Plough.

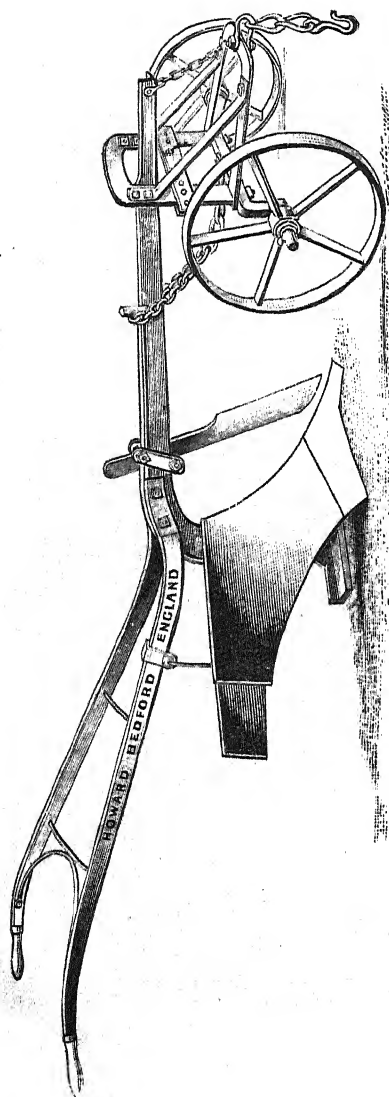


FIG. 8.—Howard's J or Chucker Plough.

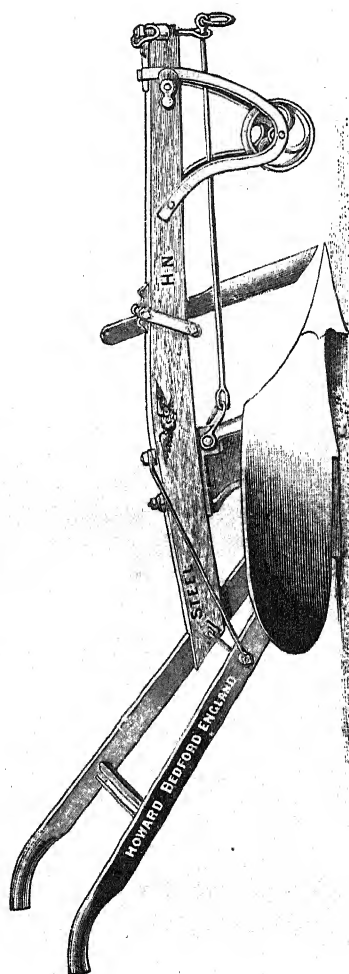


FIG. 9.—Howard's H.N. Plough.

Howard's J or Chucker Plough (Fig. 8) a type of plough that seems to be intermediate in construction between the "swan-neck" and the straight-beam, and combines the advantages of both forms, as, being high in the throat, it will plough land full of rubbish or long grass and effectually bury it. In the illustration the plough is shown with loose fore-carriage, but it may be obtained with a fixed wheel instead, if so desired. Messrs. Henwood are quoting this plough at £5 10s. (and shares at £1 7s. 6d. per dozen).

The well-known old 75 pattern of plough is shown in Fig. 9, but with steel breasts and other modern improvements. This is a splendid breaking-up plough, and is still a great favourite with a large section of our farmers. The price (Henwood's) is £2 15s., and that of the shares 15s. per dozen.

A style of plough that is very useful in old land or small cultivations is Howard's D Series, which are being stocked by Messrs. Henwood. These ploughs are made in three sizes, and have the English pattern mouldboard. They can be fitted with ridging body and potato raisers. The prices run from £3 to £4 17s. 6d., the shares being 15s. per dozen.

Of ridging ploughs, mention may be made of the following:—
(a) The "Cockshutt," which is fitted with wooden beam and with handles braced with special iron braces fixed with a bolt in place of the ordinary wood and iron rods. The plough can be adjusted to any depth of furrow desired. The price (North) f.o.r. Durban is £1 11s., chilled shares being supplied at 1s. 6d. each. This plough can also be had in all iron, fitted with double wheels, at £5 5s. (b) Ransomes' F.S.C. which is a light combined plough, ridger and potato raiser, requiring two oxen only. This plough is fitted with self-sharpening shares, and can be fitted with either one or two wheels. Messrs. Steel, Murray & Co. are agents for this plough, as well as for (c) Ransomes' R.H.R.L. ridging plough. This plough is fitted with expanding breasts, and will make ridges from 22 to 30 inches in width. By removing the breasts, share and cutter, and substituting a special share and set of prongs it can be converted into an efficient potato raiser. These ploughs also are supplied with either one or two wheels, although the latter are usually fitted to the ploughs when they are sent out from the factory.

Lastly, mention should be made of Howard's M.F. or Elephant Plough. In this plough the beam is made of iron of, it is claimed, greater depth and thickness than any similar plough made. The frame is made of either cast iron or, if specially ordered, cast steel, and is practically unbreakable. The plough will work to ten inches deep, will break up the hardest land, and will withstand the pull of the strongest team. It is widely used in South Africa for dam-making purposes.

(To be continued.)

Kafir Labour, or Our "Boys."

By J. W. V. MONTGOMERY.

ONE of the main difficulties in farm life in Natal is the irregularity of Native labour; more especially is this the case on farms which adjoin locations where dances and *utyala* (Kafir beer) drinks are constantly tempting employees to absent themselves without leave and thus break their contracts of service. As with all other races, so with the Natal Kafir, temperaments vary considerably, and these should be carefully noted by employers, and certain allowances made accordingly; in fact the average farm labourer should be treated as a school boy and a certain interest taken in him beyond the rather important point of getting as much work out of him as possible, so that after completing his contract he will go forth a better being. It is, of course, necessary to send wilful offenders to prison occasionally, especially now that such an outcry has been raised against lashes, but there is no doubt whatever that a private whipping would be far better in every way, except perhaps from a revenue point of view, for minor offences, than fining or imprisonment. Fining impoverishes them, and constantly going to gaol only hardens and makes callous those who, if lectured and administered a few strokes of the rod, would remain at their work the same bright, contented, servants which they generally are. One does not mean to infer that because a "boy" has been absent without leave for a few days he should be arrested, tied up to a wagon wheel, and lambasted with an "after sjambok" to within an inch of his life; there can be moderation in flogging as in other things, and the officers of the law could be held responsible that private whippings were carried out correctly and not brutally.

With regard to the various temperaments, the following examples give an average idea of the characters of "boys" usually to be found among a farm gang:—

(1) *Mhlokovane, alias Rui, alias Big Jem.* A tall, loosely built old *kehla* (man with head ring), getting rather long in the tooth, having seen service as a young man of 35 years during the Zulu War of '79 with the 1st Natal Native Contingent under Commandant A. N. Montgomery, formerly Captain, 2nd Batt. Royal Fusiliers; affirms (like the Christy Minstrels used to about performing in London) that he never has worked, and never will work, anywhere except at Ismont; seems to have a most unusual amount of illness in his family as he constantly applies for leave to go and see about his sick wife, or sister who has lost a child, or gives as an excuse for not returning to time that he has been

getting muti (medicine) for his daughter or young baby; occasionally (probably when there is an extra good brew on) he asks permission to go and help to bury a cousin or aunt as the other male members of the family are working at the gold fields! When working he always trudges to his kraal to sleep, although it is distant about three miles, rough going, and returns in the morning—sometimes!

(2) Nkanyezi, *alias* Fish, *alias* Skinnybounder—perhaps too fond of insangu (wild hemp) but otherwise a perfect kitchen and house boy when working, which is very seldom; gets leave on Saturday night, swearing by all his chiefs that he will be back on Monday morning, but perhaps once in three or four times he surprises one by arriving to time; tried giving him Monday off as well, but it made no difference. He is quite hurt if it is suggested that having failed to return so often it is doubtful whether he should be given leave. "Wow! haven't I got a heart? Don't I see how good you are to me, and do you think I am a dog to behave like that again after your kindness in not sending me to gaol?" This generally means leave with the same result. Has an occasional trip to the Richmond prison, but it does not seem to have any effect on him, although he appears to be very distressed if it is suggested that it is time he was again going to see his young lady at Richmond, and then goes out of the room to appreciate the humorous side of the remark with his friends. In May, 1900, he went up to Newcastle with me, and, carrying my kit bag, followed me from there towards Utrecht, where I rejoined my squadron (No. 4, N.C.), which was with the M.I. Composite Regiment attached to the 4th Division. This was about his longest period of continuous work, but he made up for it afterwards.

(3) Geke, or Keke, *alias* Bagile, is one in a thousand. Never known to absent himself without leave during his sixteen years' service. If there are insufficient "boys" on Sunday owing to any having absented themselves after being warned, Keke voluntarily fills the breach and sees everything in order before going off. Could be safely trusted with money, and even tobacco and sugar. Has been as batman to several camps and was through the 1906 Rebellion, giving very graphic descriptions on his return to his large circle of friends; from the little of it overhead he should make a good *Daily Mail* war correspondent. Has picked up snatches of camp songs, and after a little *utyala* sings, "Home, boys, home," at the top of his voice while grooming the horses. Someone suggested that it sounded rather nice at a distance; fortunately the stable is some way off. He is hard to beat at grooming, cleaning saddlery, boots, etc., and is a safe messenger in peace or war. Has made a big hole in the "lowing" herd for lobolo (payment) for his wives. While sleeping at a friend's house the evening before a rifle match I was expecting Keke with my uniform. On the kitchen boy entering in the

morning with coffee and bread and butter I rolled over and asked him, "Kona Keke?" (Is Keke here?) His reply was, "Aikona eake, kona sinkwa kupela." (There is no cake, only bread.) And probably went out thinking that he had grasped the idea rather well. Keke is much admired by the dusky damsels, and has a great array of beads which have been presented to him and with which he bedecks himself on festive occasions.

(4) Teye, *alias* Fehle, is a sleepy individual and rather fancies himself with a concertina, takes three days to do a two days' journey, then wants two days' leave to rest; otherwise works fairly well, but invariably succeeds in breaking a cup or plate when he takes a turn in the kitchen. His great delight is to come up, just as one is going out for a ride and in a hurry to be off, and ask for the loan of a shilling or sixpence. Perhaps his idea is that it will be forgotten to be entered against him on one's return, and I fancy his idea is quite correct every now and then. Have a strong suspicion that he has boiled fowl occasionally during the still hours of the night. Can as a rule be depended upon to do the wrong thing, if not watched.

(5) Gebe, *alias* Fuseke, *alias* Aron, an excellent ox wagon driver, but is generally at his kraal and hard to get even when notice has been given that the wagon is loaded and awaiting him. Very partial to *utyala*, and when he has freely imbibed, before going with a load, comes up rather too jolly, spluttering one's praises and holding forth in broken English. "Me come cn now, velly good driver Gebe, make plenty money for you wagon, not late baas, get little bit beer, jolly good beer baas, yak! Satane, Smallpox, Natal, Bockfell, goody bye, Sir, Hai Blom," and off used to go the old ship of the veld. Gebe does not have as many sick relations as Mhlokovane, but he seems to be wanted by his Chief Bubula rather more often than one would like.

(6) Funani, *alias* Slofele, is what might be termed in modern slang an easy going old "Slacker." Has gradually been cured of smoking too much insangu, which in his early days used to make him very stupid and quarrelsome. Wakes up at a "bush" hunt, is a good tracker, and excellent at woodcraft. Herds the crops and acts as gamekeeper. Has destroyed several sparrow hawks, weasels, baboons and snakes, and probably an occasional guinea fowl as a perquisite.

(7) Nkunga, *alias* Nozique, *alias* Shingfele. A tall, pleasant looking youth—well set up, strong in wind and limb, would make a good warrior, is a good all round worker and as happy as a king provided he gets leave to attend all the dances within a radius of ten miles, at which he generally takes a leading part. His forte is dancing and washing clothes. Is Keke's bosom friend, and like him is trustworthy and does not overstay his pass. Has a wonderful collection of beads and makes

a picturesque figure when dressed up in them for a dance. Takes charge of the field work when Keke is on leave.

(8) Bayshane. The pick of a very bad kraal (Viginduku's), works fairly steadily, but periodically applies for leave on account of troubles in "Little Mary." Exceptionally good with cattle and dosing calves. Knows several valuable medicinal herbs, generally wears a hat and very tattered coat, but gives one the idea of being fairly well dressed.

It will be seen from the above notes that labour is very hard to control with dispositions of this kind, and the question arises, What can be done to correct this state of affairs? Various suggestions are offered. Use Indians, stop advancing money and offer a higher rate of wage, use legislation to prevent wholesale *utyala* drinking, keep on having your servants arrested and prosecuted until they get tired of wrong doing, keep only the good workers and get rid of the balance, segregate, keep a big enough gang on to allow for a fair proportion not working regularly, take the law into your own hands and flog offenders, etc., etc. Perhaps segregating is the best of these suggestions, as it would certainly go a long way towards stopping absence without leave and servants running off to *utyala* drinks, and then legislation could better handle the question of stopping wages being advanced, and fixing a minimum wage. But at present year after year goes on and nothing is done to remedy the present unsatisfactory state of affairs. This is a matter which must be investigated systematically and a general scheme adopted, it being useless for the individual or an isolated district to try and tackle so important a subject. Much might be done, however, by the Natal Agricultural Union, or Native Commissioners, in formulating some plan to place before Parliament which would be for the good of both employer and employee, and also for the general good of South Africa.

An International Congress of agricultural associations and of rural demography will take place at Brussels in September, 1910. The object of this Congress is to compare the organisation and the work of agricultural associations of every kind in the various countries. The examination of the results achieved, the endeavour to find ways of making yet further progress through the agricultural associations, and the study of every means of improving the lot of the rural populations, will give opportunities for papers and for exchanges of views which will be of the greatest interest. All information relative to this Congress may be obtained from the Secretary General, Mr. Vandervaren, 220, Chaussee d'Alsemberg, Brussels.

The Wattle Processionary Caterpillar.

By W. E. JONES,

With an Introductory Note by Claude Fuller, Govt. Entomologist.

INTRODUCTORY.

THE accompanying very interesting record of personal observations conducted, at the writer's suggestion, by Mr. W. E. Jones at M'Fongosi, Zululand, cannot fail to be of very great interest, more especially where they go to show so clearly the true reason why this common insect, although frequently abundant in wattle plantations and presenting every appearance of a potent pest, is never guilty of accomplishing any great amount of damage.

Personally I wish to express my gratitude to my correspondent for the help he has given to me and other entomologists by following up and studying so particularly the life-cycle of this insect.

The destruction of the caterpillars by the predaceous bug, as described by Mr. Jones, is most interesting on account of the persistent and continuous method of the attack. Predatory bugs are well known to destroy caterpillars by sucking them dry of their body juices, but I have not in mind any record of a colony of these bugs passing practically through their whole life-cycle in company with their victims, daily gloating over and slaughtering their helpless prey.

The parasitism of the caterpillars by other insects is due to three distinct species. Two dipterous (or 2-winged flies and a wasp). The two dipterous parasites much resemble large house flies; the wasp is an elegant little creature, an Ichneumon.

The attack of these parasites occurs upon the caterpillars, the eggs of the fly parasites being laid upon the surface of the body, and those of the wasp inserted below the skin just as the fruit-fly lays its eggs in fruit.

From the eggs so laid emerge small maggots which live and grow within the caterpillar, feeding upon the body juices but not interfering seriously with the vital processes, so that the caterpillar and its parasite grow towards maturity, concurrently. It is only when the maggot of the parasite is fully matured that it destroys its host. In the case of these fly-parasites the *coup d'etat* is not administered until the caterpillar has spun a cocoon, preparatory to pupating. So soon as this is properly accomplished the parasite (having now arrived at its full growth as a maggot) destroys its host and uses the caterpillar cocoon as a nest to pupate in. From the pupa comes a fly which makes its emergence from the cocoon by exactly the same process as moths employ;

that is, it exudes from the mouth a liquid which so softens the silk of the cocoon that the fly can push its way through without injuring itself. This procedure is of peculiar interest because other parasites emerging from moth cocoons bite their way out.

In the case of the *Ichneumon* or wasp parasite, the caterpillar is destroyed before spinning its cocoon and the maggot bores its way out of the body of the caterpillar (already dead or rapidly dying) and spins a cocoon for itself. These cocoons are interesting from the manner in which they are suspended and because the size varies according to the sex of the maggot, the male cocoons being smaller than the female ones.

Mr. Jones, in studying this parasite, observed a case of secondary parasitism, that is the parasitism of a parasite by another parasite. The secondary parasite, which is a stout-bodied, small wasp, attacks the parasite of the caterpillar after its emergence from the shelter of its host's body during the short interval that it remains unprotected whilst beginning to spin its own cocoon. The secondary parasite deposits several eggs in the body of its host. The attack (as with the caterpillars in the case of the fly parasites) does not prevent the original parasite from completing its cocoon; but this done, the maker is soon destroyed and the secondary parasites come to maturity within the cocoon from which they emerge later as wasps through a small round hole bitten out of the texture.

In addition to the several Nature checks upon the increase of this processionary caterpillar mentioned by Mr. Jones, a white fungus parasite has recently been observed destroying colonies upon wattle trees growing in damp situations.

I hope to have ready for the next issue of the *Journal* some illustrations showing this caterpillar in its various phases.—C. F.

I.

There are two broods of the wattle processionary caterpillar. The first appears in October-November, the second in March-April. Those under observation were found only on the common yellow-flowering mimosa. The early brood this season committed great havoc, stripping the trees about the low-lying country of the Tugela completely of their foliage. The closely growing and denser groves of the *Mimosa* seem to offer a less favourable habitat for the caterpillar, a preference being shown to isolated trees or those patches with definite spaces between them wherein sunlight has a certain amount of access. Of 50 trees examined in a fairly wide radius, all being infested with the caterpillar, in by far the greater number of cases their camping ground lay facing north, so that the clusters received a certain portion of slanting sunlight each day. The dark southern side of the tree trunks rarely showed traces of having been occupied. The exceptions usually occurred on detached trunks in

more or less open country with little or no shadows from surrounding trees.

Most of the interest is centred not so much on the caterpillar as on the parasite, for to its active attention do we owe the fact of a diminution of the hordes. They act as Nature's check to undue increase, and it is probable that were it not for them such trees as the *minos*a would in course of time and in favourable localities become entirely extinct owing to their ravages.

The caterpillars themselves are gregarious. They congregate—camp down—during the day in clusters of from a few individuals to hundreds. They are covered with fine grey hairs, and are conspicuous objects when freshly moulted. In a few days the shade gets darker and more protective in keeping with the colouration of the tree trunk. Some short time prior to a further moult they take on an earthy-brown hue which still more approximates to the background. They have black legs and heads, the latter with a bright orange spot on the forehead. The hairs are extremely irritating. They shed these as easily when touched as the prickly pear does its fine spines. If unattended to the itching will continue for days and small blisters are formed. The larvæ are erratic in the movements governing their nocturnal climb. On some evenings they will commence moving shortly after sundown, just about the time at this season of the year when the small owl to which the Zulu natives have given the not unmusical name of *azavolo* begins to flit round or from a neighbouring tree gives out the first of his liquid calls so reminiscent to home ears of certain notes of the nightingale. On other days they remain quiescent as late as 10 or 11 o'clock, or fail altogether to move throughout the night. Again they will continue feeding the greater part of the day. More especially is this noticeable in the early broods when they bear the large edible caterpillar (Zulu "*izimbi*") company in its devastating rambles. Possibly the presence of the internal parasite in preponderating numbers may induce a certain amount of lethargy in the mass and account for this irregularity in the hours of feeding.

The path up the tree is clearly defined by a long sinuous web of silky threads, not unlike the trail made by a trap-door spider but less mathematically precise. Along this they ascend and descend in single file, and it is only when they reach some considerable height that they begin to break up into divergent "clumps," branching off on to the smaller twigs in their search for food. There are always stragglers both in going and returning. The silken ladder is, however, always kept so that by following this they ultimately arrive at the main body. When "camped down" they are very susceptible to sounds. A short, sharp "Ho!" will cause all of them to simultaneously throw up their heads, and so long as the sound is repeated they continue this behaviour.

They also at times betray for some less ascertainable reason violent excitement of another character, jerking their heads about viciously from side to side. Otherwise they lie absolutely inert throughout the day.

The base of many mimosa trees is frequently the house of the common medium-sized, reddish ant. It is one of the most alert, active and pugnacious of its species. Little or nothing in insect life that moves on the floor comes amiss to his appetite. In spite of this terrible activity to secure provender, and although the caterpillar camps down in the path of the interminable string of foragers hurrying and fighting all day long, the ant carefully avoids the caterpillar.

From the first week of existence they show parasitism. It is rare indeed to find a cluster of these worms without the attendant parasite's cocoon. At whatever stage examination may take place, they are in evidence. The larval parasite is a green, smooth maggot grub. On emergence from the caterpillar it at once attaches itself at its anal extremity to the tree by a number of fine threads which to the naked eye appear as one. Its change may take place whilst situated in the centre of a cluster. Hanging from this position it quickly weaves a cocoon round itself. The cocoon is a pretty little structure shaped like a squat sausage with smooth, rounded ends. It is about 5-16ths of an inch in length. When newly made the ends and certain of the markings which turn jet black show up green. This is due to the transparency of the thread of which the cocoon is composed allowing the colour of the occupant to be seen through at these points. Subsequently the general colour of the cocoon is white with black spots and bands. Immediately within the outer web a hard integumentary shell is formed which looks under a low power glass to be composed of the same glossy chitinous substance as the wing cases of some beetles. This shell is all enveloping and within it lies the grub awaiting change.

In addition to the parasite above referred to, the caterpillars are devoured by a preying bug (*Reduvius*). These interesting creatures stay by individual clusters until they are wholly destroyed. They form adjacent colonies of from 12 to 20 individuals, arriving in ones and twos, and camp alongside their prey. A daily visit to these posts at once brings home the fact that this bug is a remorseless exterminator of that particular cluster to which it is first attracted. Two of these will forcibly seize an outlying caterpillar and drag him just free from the main swarm, and by means of the long proboscis he is rapidly sucked dry. The bugs themselves undergo change, but this takes place alongside of their prey. Nothing will cause them to move from the position they have taken up until the whole colony of caterpillars is accounted for. They prey on many other species of caterpillar so that the wattle processionary merely shares its activities. The bug is easily recognised

by its elongated neck, general black colour with orange dots at the joints of its legs and antennæ. When disturbed it sidles off like a crab. The cast off skins retain their lifelike resemblance for months, the more so from the fact that they remain on the tree trunk in exactly the same position as that assumed by the groups when alive.

As the majority of the caterpillars moult and their old camping ground gets encumbered with shed skins, they take up a fresh position above. The pendant cocoons sway amongst these husks, mute tokens of the maleficent forces at work for the final destruction of the brood. How these in their turn are probed by a fly and with what results, as also some further notes, I hope if sufficiently interesting to send at some future time.

II.

Perhaps it will be better to complete this paper by transcribing from rough notes kept. By way of introduction it may be remarked that with the exception of *Tarsiger silens*—the black bush robin—birds steered clear of these caterpillars. Professor Poulton, who has paid special attention to the subject of "warning colours" in relation to the attacks of insectivorous birds on butterflies, states that the "effect of the warning colours of caterpillars is often intensified by gregarious habits." As before stated, at certain periods and probably viewed from certain angles the clusters of Wattle Processionary Caterpillars are conspicuous objects. The hairs with which they are clothed are quite formidable enough to cause inconvenience to an enemy. It is well known that the eastern section of the South African seaboard abounds with insectivorous birds. Any diligent entomologist who systematically collects butterflies can easily satisfy himself upon this point. Amongst these birds are certain of the cuckoo family, known to devour unpalatable larvæ. Many of these were in our groves, but were not seen to pay any attention to the various swarms of caterpillars.

It is only after passing through the early moult that the caterpillars get clothed with the long hairs; before that time the young larvæ are greenish in colour and the body hairs very fine and short and not in tufts. The parasitism too seems to occur at an early stage in its existence. The small, oval cocoons of the parasite are in turn subject to attack and a secondary parasitism occurs which I am inclined to think is of a dual character; the flies which emerge, although similar, have distinctive features. These may be looked for about the end of June. This secondary parasitism is very complete; out of some 50 cocoons taken haphazard from widely separated trees only two primary adult parasitic flies emerged.

During the commencement of May we had several cold nights with indication of frost and I missed the caterpillar broods in their camping down places. However, with a return of milder weather they reappeared.

The caterpillar cocoon is a hairy grey-coloured structure about $\frac{1}{2}$ inch in length. When about to pupate the caterpillar wanders about until it gets to a suitable spot under the eaves of a roof, in the crevices, in the walls of a danga, wherever in fact some sort of shelter is available. The cocoon is plastered flat on to the site chosen and woven round. The instinct of self-preservation causes them to take up a situation removed from danger and molestation because from now until it emerges as a moth the condition is one of abject helplessness. The hairs, which cover the cocoon in patches, doubtless afford a protective barrier to the onslaughts of small predatory creatures not especially adapted by Nature to overcome such obstacles. These filamentary spines are something quite separate from the hairs clothing the caterpillar's carcase and are woven independently by the grub.

From this somewhat cursory survey of the life cycle of this insect it will be seen that although it develops alarmingly, and up to a certain point does inflict great injury, Nature has provided ample means to stay its too prolific increase. Early in October the moth appears, and in a day or two the eggs can be found. Before closing I cannot refrain from again reverting to the habit of that implacable bug *reduvius*. Although usually found in colonies where they attach themselves and remain profoundly watchful of a particular brood of the larvæ, it is not uncommon to find a solitary specimen quite detached from any of his kind. These free lances move indifferently from one cluster of larvæ to another. Their tactics differ also from those of the strictly sentinel community. They exhibit no little individuality in the method of capture. I noticed one stalking two fairly well grown larvæ lying somewhat detached from the main cluster. The approach was stealthy in the extreme. The antennæ were thrown out and vibrant, the terrible proboscis bent under and stowed away below thorax. So soon as he got within measurable distance of the prey the proboscis was rapidly brought forward and stood out aggressively. At the same time the larvæ hitherto inert appeared to realise that something antagonistic threatened them, and flicked their heads from side to side and then moved away. The bug at this threw aside his cautious tactics and, like a highwayman, shaking off all disguise, boldly placed himself in the way of one, and without more ado stabbed it with his proboscis. The larva tried to wriggle off and drop to the ground, but the antennæ and front legs of bug were brought into play, and it was firmly and securely impaled on the front joint or segment of the proboscis, which was then bent upwards like a hook. With the utmost deliberation and apparent ease the bug then backed with the caterpillar held aloft and wriggling until he got to the upper side of the particular branch, when he allowed his captive once more to touch "earth." There was, however, no delay, and in a very short while the sapless body of the caterpillar was allowed to fall off to the ground.

Lucerne Tylenchus.

AN APPARENTLY SERIOUS STEM SICKNESS OF LUCERNE.*

It is officially announced that a disease, which may render the culture of lucerne on infected land unprofitable as a permanent crop, exists in many parts of the Cape Colony. The trouble is due to *Tylenchus dipsaci* (*devestatrix*), a stem-infesting nematode worm long known in Europe as a pest to rye, oats, onions, hemp, potatoes, clover, lucerne, and numerous other plants, wild and cultivated, but a creature not hitherto recorded to exist in South Africa. When adult it is a slender white worm about a fifteenth of an inch long, and owing to its small size it is barely discernible in any stage to the unaided eye. It exists in large numbers in above-ground parts of infested plants, and causes characteristic distortions and colourations which serve to indicate its presence. Infested shoots may fail to grow out more than a few inches, and the whole plant languishes, and in the course of months, or perhaps of a year or more, it succumbs entirely. The infection is spread from one plant to another in a variety of ways, and gradually so large a proportion of the plants in an infested field becomes diseased, that the crop of lucerne is not worth cutting or feeding off. The damage cannot be met by cultivating and re-seeding the land, as young plants among old diseased ones are quickly invaded and killed; and it likewise appears that badly infested lands that are ploughed and re-sown are doomed to fail again in a short time.

The presence of the disease became known to the Government during the past season only, and before then its nature and importance seems not to have been suspected by anyone in the country. It is now clear that it has been established in widely separated districts for three to four years or longer, and it is probable that it has been common in Oudtshoorn district for at least six years. Failures due to it have been attributed to many general causes for decline, such as drought, over-irrigation, unsuitableness of soil, over-stocking, age, lack of cultivation and unfavourable treatment in other respects, and very few farmers of the many whose lands have been ravaged have supposed that anything out of the ordinary was the matter. Consequently little has been said of any trouble, the disease long escaped recognition, and it is now difficult to determine its real importance. The information at present available upon important phases of the subject is still meagre, and the

* Reprinted from the *Cape Agricultural Journal*. See "Notes and Comments" in present issue.

present announcement would be premature were it not for the pressing advisability of warning farmers, without further delay, of the danger of introducing infection into clean lands. Further, an official statement is desirable to set at rest highly exaggerated reports which are being circulated. A lengthy account, embodying the results of observations in South Africa and of enquiries in Europe, North and South America, and Australia, will be compiled and published as soon as practicable, and this statement should be regarded merely as a preliminary and unavoidably imperfect contribution.

Europe, in all probability, is the source from which the pest was introduced; and notwithstanding the many other channels in which the infection might have come and might be spread, grave reasons have been found for supposing that the infection reached the country with lucerne seed, and that it is being spread chiefly by the agency of lucerne seed. Outbreaks so far located, which seem traceable to imported seed, are few in number, whereas numerous ones seem traceable to Cape grown seed. And a fair deduction from the incomplete knowledge at present possessed is that imported seed, while generally free of infection, has been responsible for a few initial outbreaks, and that Cape grown seed from some of the leading sources of supply has been much infected in recent years, and has rapidly spread the pest. The trouble has been discovered to be exceedingly widespread in Oudtshoort, and to be in Worcester, Ladismith, Beaufort West, Graaff-Reinet, Somerset East, Uitenhage, Bedford, Fort Beaufort, Cradock, and still other districts. It is unlikely that a single district in which lucerne is largely cultivated has altogether escaped infection. And although the acreage at present affected is probably still small compared with the acreage that has so far escaped, there is not the remotest chance that the pest could be economically extirpated.

Most circumstances and conditions that tend to check or to retard the growth of lucerne diminish the resistance of the plant to the pest, and hence, in general, those plants which are suffering from some other cause are the first to succumb. Yet the pest seems abundantly able to kill out plants in an otherwise most favourable environment for healthy development. That is, there is evidence that lucerne may become infested and die out owing to the pest alone in all kinds of soil, and both where it has too much and where it has too little water.

Inasmuch as it is impracticable to examine every plant, even the most competent of inspectors might easily overlook a slight degree of infection in a field. But the effect on the growth of the plant is such that the trouble may be fairly easily detected, where much of it is present, after the observer once learns to distinguish it. There is almost invariably a pronounced swelling of the stems. The swelling may involve the whole of a new shoot, or may be confined to the base or to any

other part of the stem, or to the buds. A single one or more of the shoots may be affected, and a plant which has many affected has a peculiarly stunted, unhealthy appearance. A shoot which may be only a twelfth of an inch in diameter where it joins the crown may suddenly enlarge to nearly a quarter of an inch. Whilst broadened, the shoots are shortened, and the bases of the leaves are densely crowded along the thickened part. Then the sheath-like bases of the leaf stalks, which should be whitish, are generally tinged with brown, and more or less of the surface of the thickened parts is likewise discoloured. Shoots which have been long affected may have brownish stems, quite as if they were stained with tobacco juice. The pith of diseased shoots is generally brownish for part of its length, and often is ragged and very much discoloured throughout. Within the discoloured pith and under the discoloured epidermis, and at the base of discoloured leaf sheaths, the worms are to be found. Superficially they somewhat resemble the fine whitish hairs which clothe the plant, but the fact that they squirm slightly enables one to distinguish them with a pocket magnifying glass. As a rule they are most numerous where the discolouration is greatest, and often they are so numerous in the pith as to appear to the unaided eye like a tangle of white thread. Sometimes the diseased shoots grow up and then betray the trouble by a partial blanching of the terminal growth, and often diseased buds are also abnormally pale.

Careful studies made in Europe have demonstrated that at certain stages of its life the worm is able to come to rest and then to retain its vitality unimpaired for a long period without food or moisture. This may happen in the surface soil or in the dried remains of plants. It is because of this remarkable characteristic that the pest is most to be feared. Infected stems which are made into hay may establish infection at a distance, and infected soil may be carried by water or on the feet of animals and on wheels, and may even be blown by the winds into near-by fields, and worst of all dormant infection may accompany seed. The present distribution of the trouble, however, suggests that years may elapse before it spreads even across a road or a water furrow; and hence, by the exercise of suitable precautions, there is hope that the farmer can greatly retard the progress of the pest through his lands.

It seems probable that a well established stool of lucerne may be attacked and killed within a season and practically all the plants in some fields into which the pest was undoubtedly introduced with the seed have died by the end of the third year. Such quick cases of failure can best be explained by assuming that the seed was grossly infected, and that it scattered the pest more or less uniformly all over the land, thus establishing innumerable centres of infection which soon coalesced. On the other hand, cases of apparently slow spread can best be explained on the assumption that few centres were established, as might happen

when the infection is brought in by chance on the feet of stock or in similar ways or if only traces of infection came with the seed. Most infected fields so far found are still profitable. The spread from plant to plant seems erratic, and many apparently uninfected isolated plants are to be found in lands in which most of the plants are dead or dying. The diseased condition of lands seems most noticeable in the early spring, and plants which then look very sick may appear to recover later on when the growth is naturally more vigorous. At one place where the trouble was first seen over three years ago, it is said to have ceased to spread in lands, and to have died out in one block. It is possible that its disappearance, or more probably its temporary suppression, has been due to inadvertent cultural and other treatment of the land, and that this treatment if elucidated could be imitated elsewhere.

The trouble has been known in Europe for nearly a century, and perhaps longer, and the worm itself became known to science over fifty years ago. It was discussed as a lucerne pest as far back as 1881, at which time the strain found in lucerne was thought to be a species distinct from that previously described. Recent authorities regard the strain in lucerne, however, as identical in species with the strains found in numerous other plants, but it is regarded that a strain long accustomed to a particular kind of plant does not take readily to other kinds of plants. Over fifty kinds of plants are recorded to be subject to attack by the species in Europe, and the list of food plants includes several weeds found in the infected Cape lucerne fields; but up to the present, lucerne is the only kind of plant in which the worm has unquestionably been found in the Colony.

Enquiries in Europe have not elicited unpublished information of much value in combating the pest. As far as has been learned it is not a pest of much importance in European lucerne fields, but this may be merely because various other troubles have led to a practice of growing lucerne chiefly as a rotation crop, and not as a permanent one. The leading measure for the control of such a pest as this one is crop rotation, and the alternation of maize, or some other crop or crops, with lucerne seems to promise most as a remedy for this one at the Cape. The intervening crops adopted should in time become those which experience demonstrates to be immune, or practically immune, from attack in order that the pest may be starved. If starved with clean seed on cleaned land, lucerne may be found to last as long in a rotation as it is ordinarily profitable without renewal when stock is run on it, say six to eight years. As a substitute for rotation, successive waterings coupled with almost continual close browsing by birds for a few months seems worth a trial. A watering might result in bringing to life and forcing into the plants most of the worms that would otherwise lie at rest in the soil, and the close feeding down of the lucerne without giving any

worms a chance to mature might result in most of them being devoured and thus destroyed.

The problem of helping the farmer to get uninfected seed, and that of finding some means of eradicating or of diminishing the infection when questionable seed must be used, have still to be worked out. It is suggested from Europe that seed be soaked in very dilute sulphuric acid as is done to destroy an allied pest in wheat seed, but experiments already conducted in Capetown have shown that lucerne seed itself is killed by the acid. Other substances are being tried, but the chances appear to be much against finding a fully satisfactory treatment. At present it is not known in what way the infection accompanies seed; and if it is within the seed, as seems almost certain by analogy, how such seeds may be distinguished from healthy ones. In general, imported seed seems to be safer to plant, as regards this trouble, than Colonial grown seed; but at the same time it is obvious that the safest seed is that from South African sources which are known to be clean. Imported seed passes through many hands, and there is no means of tracing a particular lot back to its local source. The dealer in South African seed, on the other hand, often has the opportunity of inspecting the fields from which his supplies are obtained, and doubtless some fully reliable dealers will be able to guarantee that what they offer is free of infection. It may be added that Europe has several lucerne diseases which are not known in South Africa, and on general principles it is therefore preferable to use South African grown seed. The root rot fungus common in Provence might prove a worse trouble than *Tylenchus* if it got established in this country. It has got to America, and is said to be a serious disease in some parts. Many farmers at the Cape who still have perfectly healthy fields should be able to supply their own needs for seed, thus avoiding any risk of a new trouble.

The course which a farmer had best follow when *Tylenchus* gets into his lucerne lands varies with the individual circumstances. If it seems reasonably certain that only a very small part is infected, the immediate uprooting and burning of all plants on it, and the keeping of it as free as possible from all plant growth for a season, meanwhile occasionally watering it to bring to activity, and hence to starvation, the worms that are in the soil, may be the best policy. If on the other hand a considerable proportion is more or less infected, the sacrifice suggested may be utterly unwarranted; and the same may be the case if surrounding farms are considerably affected when one's own is nearly clean. The close feeding down of the lands, watering them to get the worms out of the soil but not allowing the plants much time to grow, may then be much better policy. When infested fields are ploughed out, great care should be taken to get rid of the lucerne entirely, and the rotation crop that follows had best be one that requires good cultivation. Maize is

probably as good as any, for one reason because it is not known to be subject to attack by the worm. The soil may become fairly clean in a single season; but the chances seem against it, and hence the lapse of a longer interval is desirable before lucerne is again planted. Whether any special steps are or are not taken to suppress the pest, traffic from infected to clean lands should be avoided as far as practicable. This applies to movements of water, hay, manure, farming implements, vehicles, men, and animals. Hay from infected fields should be consumed on the farm, and seed should never be taken from them. In conclusion, it is notified that the Government Entomologist, Department of Agriculture, Capetown, and the Eastern Province Entomologist, Grahamstown, will report by post on any specimens of lucerne suspected of having the disease submitted to them by farmers. Several whole stools, cut off at the ground level, should be sent.

Manuring of Sugar Cane.

EFFECTS OF SOLUBLE MANURES IN CANE SOILS.

THE Experiment Station at Honolulu, Hawaiian Islands, has recently issued an interesting bulletin containing an account of work which has been taken up by the Division of Agriculture and Chemistry of the Hawaiian Sugar Planters' Association in order to gain a knowledge of the action of soluble manures on soils that are used for growing canes. The author, after twelve years' experience, arrived at the following conclusions:—

(1) The profit resulting from the application of fertilisers or manures will depend largely upon other factors than the chemical composition of the soil. Providing certain plant-food deficiencies represent the chief depressive influence on crop yields, the response to appropriate fertilisation will be commensurate with the difference between the limitations exerted upon crop production through lack of available plant nutrients and the limitations exercised by the next restraining factor in order of importance after the material has been applied. This latter factor may be physical, biological, or climatic in character.

(2) The relative effects of different combinations of fertiliser materials on the growth of sugar cane when these materials are added to a given soil will be determined chiefly by:—

(a) The extent to which their several ingredients directly or indirectly lessen the deficiencies of available plant nutrients;

- (b) The extent to which they cause the bacterial flora to approach an optimum balance for the regular production of sufficient nitrates or assimilable nitrogen compounds, and
- (c) The degrees and manner in which they produce physical changes in the soil.

(3) Owing to the fact that a definite relationship exists between the efficiency of a fertiliser mixture and the quantities and proportions in which its ingredients are associated, due to biological, chemical, and physical effects which its component parts have in a given soil, variations in the composition of the mixture beyond certain limits may materially influence crop yields.

(4) A more definite knowledge concerning the amounts and proportions of fertiliser salts to use in a mixture for best results would on some soils yield pronounced profits, while a lack of such knowledge may in some cases result in a loss, especially when soluble salt are employed.

(5) The greatest loss from the use of improper mixtures of fertilisers is apt to occur on acid soils, and in such cases considerable risk is involved from the continued application of mixtures containing ammonium sulphate, sulphate of potash, and acid phosphate, when lime dressings are not previously made.

(6) While the chemical and physical analysis of a soil will usually prove of value in indicating the best cultural methods to follow in maintaining or improving its fertility, and may also indicate in a general way certain of the plant food deficiencies in given cases, it cannot afford definite information as to the amounts or proportions of ingredients in fertiliser mixtures which will give maximum returns.

(7) It is possible that the data from more extended field experiments with a large variety of soils, when reviewed in connection with the comparative analysis of the soils, using both weak and strong acids as solvents, may indicate a somewhat definite relationship between the analytical figures and the order of importance which phosphoric acid and potash should assume in cane fertilisers in given cases.

(8) It would appear that analyses of soils, with more special reference to their physical qualities, reaction and content of organic matter, nitrogen, and more readily soluble lime, may, with due consideration of the water supply and climatic conditions, be relied upon to indicate such manurial treatment as will result in a profit, although they will not afford definite information as to the weights and proportions of the ingredients in fertiliser mixtures which will result in maximum efficiency.

(9) Nitrogen is the most important element to be considered in the fertilisation of the sugar cane in the Hawaiian Islands, and when applied in mixed fertilisers some risk of reduced efficiency is entailed

if either the potash or phosphoric acid (in the form of soluble salts) is made to exceed the weight of this element.

(10) Unless through past local experience or carefully conducted field tests it has been definitely determined that a modified formula may be expected to give greater yields, it is safer, when applying nitrogen, potash and phosphoric acid in the form of soluble salts, to have the mixed fertiliser contain even quantities of these elements, which are not to exceed 60 lbs. per acre in the case of each element.

(11) Field tests with fertilisers whose ingredients are mixed in varying proportions will, if such experiments are accurately and scientifically conducted through a sufficient period give the most reliable information as to the best manurial practice. Such experiments should be laid out in very long, narrow, parallel and contiguous plots or strips, with the untreated control areas lying immediately adjacent to the fertilised cane.

(12) The great impertation of "resting" fields in rotation on Hawaiian plantations, and growing upon them leguminous crops is very clearly indicated. This applies more particularly to the irrigated plantations, where the supplies of organic matter are, in the majority of cases, becoming greatly reduced through successive tillage operations in a comparatively arid climate, and by the favourable conditions created for bacterial activity through regular irrigations under uniformly high temperatures.

The weaning foal that develops even growth to maturity will not only make a heavier animal, but will also be more durable when subjected to industrial service. The stunted youngster never overcomes the neglect of the breeder by any subsequent liberal feeding. To stunt a foal in his first year's growth is like a scar from a wound—it will always show in his matured individuality.

No buildings used for dairy purposes should be kept within 100 feet of a pigsty, horse stable, or other house that emits dangerous odours. Water from open wells or pools into which surface water flows, if used in washing or rinsing milk pans, often carry disease. Every dairy shed should be built on high ground so that the water will run away from it instead of toward it, and the yard should be thoroughly drained with tiling.

Transmission of Diseases by Insects, etc.

A REQUEST FOR COLLECTIONS.

It has become increasingly apparent during the last decade that blood-sucking flies, fleas, ticks, etc., are active agents in the transmission of both human and animal diseases, and this is especially the case in tropical and sub-tropical countries. For the adequate investigation of such an important matter large collections of these insects, etc., are required, and a systematic study of the subject is being undertaken at several scientific centres in England. The British Government is endeavouring to procure collections from all the British Possessions in order that there may be ample material for the prosecution of these vitally important problems; and His Excellency the Governor, Sir Matthew Nathan, desires that collections sent from Natal shall be thoroughly representative of the Colonial fauna.

In a country so pest-ridden as Africa, where Rinderpest, East Coast Fever, Horsesickness, Sleeping-sickness, Malarial Fever, Mediterranean Fever, Enteric, etc., are too well known, the great urgency of the undertaking is apparent, and it is thought that many persons would be pleased to assist.

The following directions for collecting specimens are given, as they will be helpful to those who desire to aid the cause of preventative medical science. It is most important that the locality, the date of capture and the collector's name should be attached to the specimens, which should, of course, be in as perfect a condition as possible. Small collections or even single specimens will be gladly received by the Natal Museum, Pietermaritzburg, and will be duly acknowledged, and will be forwarded to the various institutions where the investigations are being undertaken.

The directions above referred to are published in the form of a pamphlet by the British Colonial Office, for general information, and are reprinted below in full.

DIRECTIONS FOR COLLECTORS.

FLIES.

Diptera or flies are distinguished in general by possessing only one pair of wings, and also by the fact that behind the wings, on the next segment, are borne small knobbed organs called "balancers." Flies may suck blood (mosquitoes, horseflies, sandflies, etc.), or be parasitic on man or animals, either in the adult or larval state (bots, etc.).

Collection.—For collecting flies only a moderate outfit is needed, the necessary articles being a net, a killing bottle (failing which chloroform may be used), entomological pins, a pair of entomological forceps, boxes, and cork.

The net.—For actively flying forms a net is necessary. Any of the ordinary butterfly nets will serve the purpose. If none are to hand an efficient net is easily made:—(a) Bend a stout piece of wire (telegraph wire will do) into a circle and insert the two ends into a stick. The circle should have a diameter of about one foot. To the wire attach a muslin bag, which should be about two feet in length and should taper to a blunt point, the seams being made to come on the *outside* in order to avoid giving lodgment for small insects. (b) A stouter and more convenient form is made thus: Procure a Y-shaped tube, the two forks having a narrower bore than the stem, and making a right angle with each other. Fit an ordinary cane into the forks and a stout stick to serve as a handle in the stem. The cane is thus bent into a circle, to which is attached the muslin net as before, the base of the net being turned over in such a way as to form a tube through which the cane can be pushed. This makes both a cheap and portable net.

The killing bottle.—This can be made by any chemist, or a simple one may be prepared as follows:—Into a wide-mouthed bottle put a half-inch layer of mixed plaster of Paris. Above this pour a layer of mixed plaster and potassium cyanide to a depth of half an inch. The cyanide may be in small lumps or powdered. Cover the whole, first with quarter of an inch of dry plaster, then with half an inch of plaster moistened to the consistency of a cream.

Precautions in using the killing bottle.—(1) In damp countries the surface should be covered with several layers of blotting paper to prevent wetting of the specimens; (2) The stopper should be well-fitting, and when the bottle is not in use should always be kept in; (3) If the surface becomes brown, and the smell faint, scraping will restore its efficacy; (4) Insects should be removed from the killing bottle as soon as they are dead (usually after five minutes).

Mounting.—The only satisfactory way of preserving diptera for identification is by dry mounting. This process, however, is simply done, and takes but little time:—(1) If only one fly of the same kind be obtained pin it *sideways* through the thorax; (2) If two be obtained, treat the first as before, but pin the second *vertically* through the thorax; (3) Where possible, at least six specimens of the fly should be sent.

Pins required.—Headless silver pins are far the best, others causing verdigris to appear sooner or later. Two sizes only are necessary: No. 3 (15 mm. in length), and No. 0. Both sizes can be obtained from Messrs. Watkins & Doncaster, 36, Strand, London, from whom all entomological requisites can be obtained. The larger size may be used for large flies, but the smaller for flies (as big as the common house fly or smaller).

Boxes.—Pinned flies may be sent to England in any small box, such as a cigar box or tobacco tin, though metal boxes are preferable. A

piece of sheet cork or cork carpet is made roughly to line the box, in which it must be made to adhere firmly. On this the flies are pinned, and the whole is covered by a sheet of paper resting on the surface of the pins to prevent damage due to any specimen which may get loose. If pinning is impossible, the insects may be packed separately in small pill or match-boxes. These boxes may be packed in layers of tissue or cigarette paper, held in place by pledgets of cotton wool gently compressing them. The flies can also be enveloped gently in tissue paper and placed in a box, in dry sawdust moistened with carbolic acid. A drop or two of carbolic acid dropped upon the inner side of the cover of the pill-box will also be useful as a preservative against mould or insects feeding on dead specimens. With each specimen particulars should be given:—Date and place of collection, host being sucked, the collector's name, the colour of living specimens, and other remarks of interest. These details should be written as *legibly* as possible. Where flies are pinned the pin may transfix the label. Where flies are boxed the label should be gummed to the box, or be laid loosely inside it. *Larvæ* of flies may be killed by a moment's immersion in boiling water. Preserve in 50 per cent. spirit, but do not place many specimens in a tube.

TICKS.

Adult ticks are eight-legged creatures which live by sucking the blood of their hosts (man and other mammalia, birds, reptiles, amphibians—rarely insects). They bore their mouth-parts deeply into the skin, and are at times difficult to remove.

(1) The *large* bean-like creatures are females. The *small* flat creatures are young females, males, and immature forms. As many different forms as possible should be collected, males especially being looked for. They may be recognised by having the whole back covered by a hard shield—they are often found beneath the gorged females.

(2) If roughly removed, an important part—the “false head”—will be left behind, embedded in the host's skin, and the specimen spoiled. This must be avoided. If the creatures will not come away without breaking, they should be induced to let go by touching them with a brush or finger dipped in any oil.

(3) All parasites from one species of animal from one locality may be placed in the same tube, but care must be taken not to mix the parasites of different animals (*e.g.*, sheep and cattle) though from the same place. Especially is it important to keep parasites from different localities separate.

(4) Label *legibly* in pencil (dark); place the label *inside* the tube. State the name of the host, colour of living tick, date and place of collection, and collector's name on the label.

(5) Specimens may be sent (*a*) preserved in spirit, or (*b*) dry. (*a*) Sixty per cent. rectified spirit should be used as a preservative, but

specimens must not be crowded into tubes; (*b*) Pack specimens dry, so that they will not shake together, placing if necessary, soft paper or a piece of rag (*not* cotton wool) in the tube.

FLEAS.

Fleas are found on mammals and birds, in the hair or feathers. They are also found in their holes or nests. As soon as their host gets cold the fleas leave it. In the case of large mammals the fleas may be captured by turning back the hair soon after death. The fleas can be killed by touching them with a brush moistened with spirit, chloroform, or benzine. They will stick to the brush and readily float off in the tube of preservative. Should the host be small, place it in a small box or linen bag, with a few drops of chloroform, or benzine. The fleas will then be found dead on the bottom of the box or bag, or among the hair, when the same is turned back. Bats, rodents, and small mammals are all good hosts.

To secure fleas found on birds, the following plan should be adopted:

Take the nests of birds as soon as the young have left them. Place the nest in a box, preferably one lined with white paper, and with a glass top. From time to time the nest should be slightly damped. The fleas will frequently keep emerging from their pupæ in the nests for six or eight weeks after the nests have been taken. The live fleas can be taken off the sides and top of the box with a camel's hair brush dipped in chloroform or benzine.

"Chigoes," which are highly specialised fleas, occur on man, various mammals, and birds in warm countries. The females bore into exposed portions of the skin and swell to a considerable size. They should be carefully collected. In the case of small mammals the skin to which they are attached may be removed and preserved in alcohol.

BUGS.

These are found not only in human habitations, but also in birds' nests and the habitats of bats. The general directions as regards the collecting and transmission of ticks and fleas also apply in this case.

PARCELS.

Tubes containing specimens are best packed in a small tin box, such as a tobacco or cigarette tin, care being taken to allow plenty of cotton wool or dry sawdust between the tubes to minimise the risk of shocks. In all cases use a *separate* label or tag bearing the address and stamps (to minimise shock of stamping in the post). The label should be firmly attached. Boxes containing dry or pinned specimens of flies or ticks should be packed in a stout outer box, surrounded by cotton wool or sawdust.

Collections should be addressed—"O.H.M.S.—The Director, Natal Government Museum, Pietermaritzburg."

Export of Chilled Beef.

SUCCESSFUL AUSTRALIAN EXPERIMENT.

THE whole of the meat trade of the United Kingdom has been profoundly interested in the arrival in the London docks at the beginning of November of a cargo of chilled beef from Queensland. There have been several attempts made by Australians previously to this to carry chilled meat to the United Kingdom—that is, meat that has not been actually frozen,—but hitherto such attempts have been failures; and the arrival of this consignment in good condition is therefore all the more remarkable and interesting, whilst additional interest is lent to the event by the fact that with the new development the American Beef Trust suddenly finds it has a new and powerful competitor. Hitherto, of course, as our readers are doubtless aware, the United Kingdom has been obliged to depend upon the American Meat Ring for its chilled beef supplies, and the Ring, being without a competitor of importance, has been able to control the market.

The manager of a Smithfield firm which has procured a large portion of the first Australian consignment by the *Marathon* told an *Evening News* representative that the meat, which is of a high quality, was fetching 2s. 2d. to 3s. 2d. per stone of 8 lbs., the price varying in accordance with the quarters preferred. The opinion was expressed that, although the sale was as good as could be expected—the English butcher, like other people, being chary about purchasing too much of anything new to begin with—as soon as the meat has had a fair test the demand is likely to become a large one.

The difficulty with chilled beef hitherto has been to keep it in condition long enough to stand the voyage. There has for many years been a considerable import into the United Kingdom of chilled beef from the United States—as much as 1,300,000 quarters have been brought in in one year,—but owing to the enormously increasing home demand in the United States, and to much of the area being taken up for wheat growing, the exportable supply has been a diminishing quantity, and probably this year not much more than 400,000 quarters will be exported to the United Kingdom from the United States. The North American Meat Ring, known in England as the Beef Trust, which controls the North American trade, has had, therefore, to look elsewhere for supplies, and they have accordingly in recent years bought up some of the largest meat works in the Argentine, so that to-day they are sending more than half of the chilled beef that goes from there to England, and at present exercise a commanding influence on the English markets.

With the exercise of the greatest care and at some risk (so that the premiums which have to be paid to underwriters to insure the meat arriving in good condition are very high) chilled beef can often be brought from the Argentine in fast steamers using chilled chambers. But up till last month there has never been a shipment of chilled beef from Australia or New Zealand which has turned out satisfactorily.

After various attempts, an effort was made, the *Evening News* proceeds to relate, under a new system, in the year 1897, and this got nearer success than any other. The S.S. *Urnston Grange* in that year carried, in chambers fitted up for the carriage of chilled beef, a cargo which previous to loading, had been dipped in boiling refined cotton seed oil, and the meat arrived in England in good eatable condition. But, on account of its unpleasing surface appearance, due to the oil, it met with little favour in the market, and was not a commercial success.

This cotton seed oil experiment was made by Mr. Joseph A. Linley, and its partial success encouraged him to set to work to solve the problem on other lines. It is he who has perfected the system under which the beef which arrived by the *Marathon* was carried.

Although it may not be very widely known outside the trade, chilled beef treated by this system—known in the trade as “Linley Beef”—has already, the *Evening News* states, been on the market for a year or two. Over 130,000 quarters brought from the Argentine have been put on the London market, and the beef has proved very satisfactory.

“The root idea of the system is simply cleanliness. It consists of sterilising the surfaces of the meat, the holds of the ship, the barges, and the meat stores, so as to have all these surfaces in the most cleanly and aseptic condition. In addition to this, the atmosphere of the chilling chambers on board the ship is daily dried and cleansed so as to keep the air pure. The system has had to be subjected, of course, to the most minute examination by the health authorities, and it has been tested not only by the medical officers of the Local Government Board, but by the searching analysis of eminent bacteriologists. It has passed these tests triumphantly.”

It is a mistaken policy to attempt to make young pigs convert a large quantity of coarse and innutritious food into sufficient sustenance to keep the pig growing and in a store state; the object should rather be to feed the pig from its birth in such a way that it becomes fit for slaughter in the quickest time.

Stack Silage.

THE advantages of conserving green fodder in stacks consists in the economy of the process, the cost being nominal only. A further advantage is that where the crop is good or the growth of natural herbage is luxuriant, stacks may be constructed in localities so situated as to require cartage for short distance only. Such sites should, as far as possible, be chosen with a view to economical stacking or pitting and distribution of the silage when being fed out, therefore this advantage will be gained by building where paddocks converge. A well-drained site should be selected, and, if necessary, it should be levelled to ensure a secure base. The ground should be covered with timber evenly laid on the surface, or with a good bed of straw, to prevent moisture rising from the soil into the fodder. All surface water should be cut off. If logs are used as a bed, all space should be well filled with earth to prevent access of air into the bottom of the stack. Mr. G. M. McKeown has contributed a useful article to the *Agricultural Gazette* of New South Wales on the subject, in which he points out the methods which are followed at the Wagga Experiment Farm in the building of a silage stack, and, in view of the importance, particularly at the present time, of the subject of the provision of winter feeding for stock in Natal, we think that what Mr. McKeown has to say with regard to stack silage will be read with much interest by farmers in this country.

So long as the weather is fit for cutting by mowing machine or reaper and binder, it will not matter, he says, if the material is wet at the time of stacking, as it will not suffer damage.

In this point silage-making possesses a great advantage over hay-making, as in the latter case dry, warm weather is essential to success.

It is of the greatest importance that the base of the stack should be of right dimensions, so as to ensure the least possible amount of surface exposure and the exercise of the greatest possible pressure on the lower part of the stack by the upper portion of the material, therefore a careful estimate of the amount of available fodder should be made before commencing to build. It is inadvisable to build small stacks, owing to the greater waste consequent on the larger surface exposure in proportion to the quantity of material. A stack to contain 25 tons should be the least size that should be attempted, and where only this quantity of fodder is available, it will be found preferable to use a pit or a disused room or building if such is available, as in the latter case even a much less quantity may be conserved. The base of a 25-ton stack should be about 10 by 10 feet. About 45 cubic feet of good silage will make a ton. Stacks to contain from 50 tons upwards will be found preferable owing to lower pro-

proportionate waste, and the larger they can conveniently be built the better. A base of 14 feet square will carry 50 to 60 tons, and 18 feet square will carry 120 tons, and so on in proportion if not built too rapidly. It is preferable to allow intervals for settlement, as by thus allowing time the stack may be more compactly built and the lift may be considerably reduced. Where a large quantity of material is available, the erection of two or more stacks may be proceeded with alternatively, and thus no time need be lost.

The best time to cut grass and other natural herbage is when it is in flavour, and cutting may be continued as long as the crop is in succulent condition. It should be carted and stacked as promptly as possible so as to prevent loss of moisture.

Wheat, barley, vetches and peas should be in a similar stage of growth in the drier districts, while in coastal and other moist localities they may safely be cut in a more advanced condition, as in the latter case the fodder is likely to contain more moisture than is usual under the former conditions, and they do not dry off so rapidly after cutting.

Wheat alone is of rather too dry a nature for successful conservation in stacks, therefore it will be found safer to conserve it in pits from which air may be excluded more effectively than is possible where stacking is adopted.

Where natural grasses are to be conserved, pits will be more effectual than stacks, as, owing to the number of varieties of which most pastures consist, the periods of ripening vary so much that the earlier kinds lose much of their succulence, while others remain in a backward condition. In cases where trefoil or variegated thistles predominate, the stack system may safely be adopted, as both contain a much larger proportion of moisture than is to be found in the grasses, even where the latter are in their best stage of growth.

In dry districts it will be found advisable also to cut maize at an earlier stage of growth than is usual in the moister conditions prevailing on the Coast, and to use pits or buildings in preference to stacks, as the comparative dryness of the fodder causes greater loss in stacks than that which occurs in the case of fodder plants of finer texture, which admit a more compact stacking than is possible with those of coarser growth.

The chaffing of maize is recommended, and therefore its conservation in a walled receptacle is necessary to secure the best results in quality and quantity of silage. The material if stacked whole should be spread evenly, and if cut with a reaper and binder the bands should be cut and drawn so as to admit of more compact building and the more effectual exclusion of air. If the bands are left intact, there are liable to be considerable spaces between the sheaves if they are full size. The butts of the sheaves should be placed outwards, each row binding the next, and the material should be well trodden from the start. Under no circumstances

should material be placed transversely in layers, as by this means a large quantity of air will be admitted into the stack and loss of fodder will naturally follow. Special attention should be paid to the sides and corners, so that they may be as compact as possible. The sides should be kept plumb, and the corners well rounded off. The surface of the stack should be kept quite level while in the course of erection, as, if the middle be raised, the material when saturated with moisture has a tendency to slip outwards; and an outward slip is much worse than an inward one, as it is difficult to remedy. Should an outward slip occur, it should at once be remedied by strong supports being placed on that side of the stack. Greater safety in building may be secured by the erection of a few posts with occasional pieces of timber secured to them horizontally on each side of the stack.

At the close of each day's work it is advisable to apply some pressure to assist in consolidating the material, and some heavy timbers of good length will be found very useful for the purpose. The weights should be removed on resuming work, but on the completion of the stack they should be allowed to remain on top. The material should be thoroughly compressed by treading during the erection of the stack, and this operation will be greatly assisted where some support to the sides such as described is afforded. Pressure may be applied by mechanical appliances, or by placing heavy timbers, stones, bags of earth, etc., on the surface of the stack. Sufficient pressure should be used to ensure the thorough compression of the material in the upper portion of the stack, which, in its turn, provides pressure for the lower portions. Failure to exclude air by insufficient treading of the material, or by insufficient application of pressure to the upper portion of the stack, may cause spontaneous combustion, or, at any rate, considerable actual loss of material by overheating. Similar results may arise from the use of material which has passed the requisite stage of succulence. Should it be desired to take the temperature, a piece of metal pipe should be built into the stack, so as to admit of a thermometer being suspended, by means of a flexible wire, fairly in the middle of the sack. The thermometer can then be withdrawn when it is desired to ascertain the temperature. Fermentation commences at 90 degrees Fahr.; and, as it is undesirable that the temperature should rise above 150 degrees Fahr., more pressure should be applied should it appear likely that the limit will be exceeded.

A stack, when built as high as possible, may be rounded on top and well covered with straw, so placed as to throw the rain off; or it may be covered with galvanised iron or roofing felt. The more permanent roofing is to be preferred in districts liable to heavy rain, and there the use of the latter material will be advantageous for protecting the sides.

A stack may be opened and the fodder used in eight to twelve weeks after completion; but sufficient for the day's consumption only should be

removed, as it is liable to deteriorate when exposed to the air. A hay-knife should be used to cut it out.

As little as possible of the opened portion of the stack should be exposed, and loss may be prevented by covering it with a tarpaulin or dry straw.

The feeding value of silage will be greatly improved by a selection of varieties of plants, which, where possible, should be grown together for convenience in harvesting and stacking, and so as to ensure a more regular admixture of fodder plants possessing varied qualities.

Thus, field-peas or vetches should be sown with oats, barley, or wheat intended for silage; and, apart from the added value of the silage, the leguminous plants will prove of value in fertilising the soil. The growth of crops for silage will prove of great value in combating the black oats pest, as owing to the necessity for cutting such crops before maturity, weeds may be removed before the seeds can ripen.

Where conditions are favourable for the growth of cowpeas, they may be sown with maize, or in separate areas, and the respective crops mixed when stacking or pitting.

Lucerne, also, may be profitably harvested from the area devoted to its separate culture, and mixed with any crop with which the growing period corresponds.

For feeding cattle the quantity of silage to be used will vary with the age and size of the animals, and the quantity of natural pasture which is available.

The nutrient value of the fodder will naturally vary with the crops composing the silage, but in most cases it will be found desirable to add to the ration some grain, oilcake, or bran. The silage ration will range from 15 to 45 lbs. per day, according to the conditions described and the purpose for which the stock are fed. For sheep, the allowance should be 3 or 4 lbs. per head, with about 4 ozs. of grain per day where improved condition is sought.

Where it is desired to conserve fodder in pits in the drier districts, it will be found that the cost of excavation is very moderate, amounting to about £5 for a 100-ton pit. Two of the sides should be vertical, and well trimmed, the other two having batters of 1 to 2, or 1 to 3, so as to admit of working the plough and scoop during the excavation of the pit, and for convenience in filling it with fodder after completion.

In filling the pit, the instructions for stacking should be carefully followed, but the compression of the material and the exclusion of air will be found much easier than is the case in stack building.

The work of consolidation will be greatly assisted by the passage over it of the teams conveying the fodder, which should be driven in at one end and out at the other. In large pits a horse and rider will do good work in trampling the fodder after it has been spread.

The material may be extended a fair distance outwards along the deeper parts of the batters, and, if necessary, carried above ground as a stack to such a height as may be convenient. When extended far above the surface, pressure will be necessary to consolidate the upper portion; but if the excavation only be filled, covering with the earth which has been removed from it will exert sufficient pressure, while at the same time it will prevent the access of air.

The durability of silage conserved in dry pits should exceed that of stack silage, as the outsides are not subject to the action of air or rainfall.

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

I CONCLUDE that nine pounds of pork from a bushel of raw corn [maize] fed in the ear, twelve pounds from raw meal, thirteen and a half pounds from boiled corn, and sixteen and a half pounds from cooked meal, is no more than a moderate average the feeder may expect to realise from a bushel of corn under ordinary circumstances of weather, with dry and clean feeding pens.—F. D. COBURN (*"Swine Husbandry"*).

CUTTING MAIZE FOR ENSILAGE.

In order that ensilage may keep well, corn [*i.e.*, maize] should be cut about the time the kernels are well glazed and dented. If it is cut too green, as stated, too much acid develops; if cut too ripe it does not settle properly and the air is not sufficiently excluded to prevent spoiling. The ripest corn should always be cut first and placed in the bottom of the silo, because the great pressure near the bottom will tend to exclude the air.—BYRON HUNTER, *U.S. Bureau of Plant Industry*.

WATER AND THE POTATO PLANT.

It has been shown clearly that the available water content of the soil exerts a great influence upon the life of the potato plant, upon its assimilation of plant food, and upon the yield. At the Wisconsin Experiment Station it was found that when two acre inches of water were added in two irrigations in one case the yield was increased 100 bushels of saleable potatoes per acre, thus showing that the right amount of water at the right time is a very important factor in determining the yield.—SAMUEL FRASER (*"The Potato"*).

ABSORPTIVE POWER OF SOILS.

Soils differ greatly in their power to absorb and retain water. Those which absorb most water retain it for the longest time. The power of absorption is due to the surface attraction of the particles of the soil for water. The finer the particles of the soil, the greater will be the amount of water absorbed, because the total surface of the particles is greater, and the longer will it be retained. Thus a soil consisting of coarse gravel will not retain water. A soil of pure quartz sand will absorb but a small quantity, and will soon part with it, while a fine alluvial soil will absorb a large amount, and retain it a long time.—HENRY STEWART (*Irrigation for the Farm, Garden, and Orchard*).

PLOUGHING UNDER VEGETABLE MATTER.

All decaying vegetable matter ploughed under adds to the mechanical improvement and water-holding power of the soil. The quickest returns are obtained from the green vegetation, the most lasting from the dry, whether leguminous or non-leguminous. The latter, if not thoroughly placed in the soil to insure decay, are liable to dry out the soil. The mechanic who can devise a machine that will cheaply convert an old straw stack into a meal like alfalfa meal, to be sown broadcast and ploughed under, will be a public benefactor by supplying to the soil a mechanical improver standing second only to a good manure pile. In the form of meal the straw will help the mechanical condition of the soil from the start and not hinder in the first year as it would if ploughed under as uncut straw.—H. R. HILTON.

COVER CROPS FOR CITRUS GROVES.

In the judicious management of the citrus grove, the use of a cover crop is frequently an important factor and one well worthy the consideration of the producer of citrus fruits. Not all soils can be treated in the same way. The soils are unlike, conditions differ and no one should know the peculiarities of any soil better than the man who tills it, who comes in contact with it day after day. He should study it carefully, become acquainted with all its peculiarities and then he is in a position to handle it to the best advantage. No other person can know so much about a given piece of land as the intelligent man who tills it and studies it as he works. He, in the end, should be best able to decide whether clean culture throughout the year, clean culture with a cover crop, or no culture is best for his conditions. The amount of fertility in the soil, the amount of available moisture, the physical qualities of the soil and the climate are the more or less known quantities with which he must work out the equation of citrus fruit production.—H. HAROLD HUME (*Citrus Fruits and their Culture*).

Natal Bee-Keepers' Association.**MONTHLY NOTES AND COMMENTS.**

By W. C. MITCHELL, Hon. Secretary, Cedara.

THE membership of the Association now approximates 70, every one of whom are practical bee-keepers. With an annual subscription of 2s. 6d. we hope to reach the century very shortly.

* * *

The first Bill enacted by the Natal Legislature dealing with the importation of bees has been gazetted. Although not as stringent as it might have been it is at least a step in the right direction, and every member must use his or her influence in an attempt to secure even more drastic regulations. For the information of members a copy of the Bill, which is entitled "The Exotic Animals and Animal Products Act, 1909," is published in these pages.

* * *

November has been a very disappointing month for most bee-keepers, excessively dry weather rendering the securing of any surplus quite out of the question.

* * *

I understand that a bee-keeper in East London has been ordered to remove his bees out of the town. In the absence of any information as to the circumstances surrounding the case I am unable to express any opinion as to the justice of such a proceeding, but one wonders what these particular bees have done to deserve such disgrace!

* * *

I hope all bee-keepers, whether members or not, will endeavour to exhibit at our first annual show, which is to be held in June in connection with the Show of the Royal Agricultural Society in Maritzburg. The above-named Society having granted our Association the sum of £7 10s. towards the prize list, we trust that the exhibition will receive due support.

* * *

Although January does not indicate the commencement of a new year as far as a bee-keeper's calendar is concerned, I wish all brothers in the craft the heartiest of good wishes for the coming twelve months. May the current season yield a bumper honey crop.

DISTRICT NOTES.

Camperdown.—Mr. Gavin reports that no swarms have appeared during the month and that very little of either pollen or nectar is being secured. Some trouble has been experienced with ants, which was stopped by placing the legs of hives in tins of sheep dip.

Cedara.—Owing to the excessively hot, dry weather bees have secured no nectar or pollen worth mentioning. On several occasions 104 degs. F. was registered.

Fox Hill.—Mrs. Keytel reports having secured surplus from seven stocks, and three swarms as having issued during early November. Nectar being obtained from orchard trees and wild bramble. Pollen of a cream colour and sometimes of a dark red being obtained.

A FEW AXIOMS.

-
- Keep your colonies strong.
 - Keep a record of the age of all your queens.
 - Bees filled with honey never want to sting.
 - Smoke compels bees to fill themselves with honey.
 - Do not make quick movements close to a hive; be most deliberate.
 - Having many swarms means little honey.
 - Queenless colonies are a prey to all enemies.
 - Keep up-to-date by reading good bee journals.
 - Keep a careful record when honey flowers commence to bloom: it will be valuable for future reference.
 - Keep your hives shaded from the mid-day sun.
-

EXOTIC ANIMALS AND ANIMAL PRODUCTS ACT.

The following is the text of the Act "To control the introduction into Natal and to regulate the disposal of exotic animals and animal products," which has been passed by the Natal Legislature this Session:—

Be it enacted by the King's Most Excellent Majesty, by and with the advice and consent of the Legislative Council and Legislative Assembly of Natal, as follows:—

1. No animal or animal product mentioned in the schedule to this Act shall be introduced into the Colony by sea or land save with the consent of the Minister of Agriculture previously obtained, and under such conditions as he may prescribe.
2. Any animal or thing which may be introduced into this Colony in contravention of this Act or the regulations which may be framed there-

under shall be confiscated and destroyed or disposed of as the Minister in charge of the Agricultural Department may direct.

3. Any person who may contravene any of the provisions of this Act or of the regulations which may be framed thereunder shall, on conviction in the Court of a Magistrate, be liable to a fine not exceeding one hundred pounds sterling, or, in default of payment, to imprisonment with or without hard labour for a term not exceeding six months or to both such fine and imprisonment, unless he shall prove to the satisfaction of the Court that the introduction was made by him unknowingly and without negligence on his part. Offences under this Act shall be cognisable in the Courts of the Magistrates having jurisdiction.

4. Nothing in this Act shall be deemed to repeal the provisions of any Law or Act relative to any disease of animals.

5. This Act may be cited as "The Exotic Animals and Animal Products Act, 1909."

SCHEDULE.

Bees and their larvæ, honey, beeswax including foundation comb, honeycomb and other manufactured products of apiculture.

Such animals as are usually included among zoological specimens.

HINTS FROM THE HIVE.

AIDS TO HONEY PRODUCTION.

(By H. MARTIN, Dannhauser.)

In apiculture, as in every other pursuit, the bee-keeper who desires the best results with the minimum of loss must give attention to the details of the craft, and make the very best use of appliances and methods which experience has proved are helps to honey production.

Comb Foundation and Drawn-out Comb.—These are items of the very highest importance from the point of view of the honey producer. If we really want filled sections or frames we must never allow our bees to waste their time in comb building when we can employ them better in bringing in the precious nectar. "Starters" may achieve the object for which they are intended, *i.e.*, insure straight combs in the line we wish them built, but, make no mistake, "starters" are false economy at the best, a "penny wise and pound foolish" practise. If we wish to prove this it is only necessary to hive a swarm on full sheets of foundation and another on "starters," and if both swarms are about the same size and possessed with equal energy, a fortnight will be sufficient to prove the advantage of using full sheets. It is true, no doubt, that the bees on the starters will work wonders in a few days, but they will not keep up the pace; we may

find a large patch of brood even after twenty-four hours' occupation where the starters are used, and great strides in comb-building, but if we look at the hive with the full sheets we are more than likely to find four times the progress both in comb building and egg production, and this ratio will be more than maintained as time goes on. This is not all. In a month's time the number of bees hatching out in the foundation hive will be so much greater than in the hive with only starters that the force of workers will be doubled, and just here is where the gain comes in. Our strong hive will have grown until it is ready for supering perhaps just at a time when the honey is in flow; the other hive not having the same advantage is not ready to work the flow till the season is passed, and here we lose on the few shillings we saved in foundation perhaps a fine honey crop.

With ready drawn out comb we are much better still, so that a stock on hand is the finest possible asset that a bee-keeper can have. It not only increases his yield considerably, but he can always take the honey flow at once and to the greatest advantage as honey is stored very rapidly when combs are drawn out to receive it. To those who work for section honey such a course is not possible, and the best they can do is to give full sheets of foundation and trust the bees and the state of the honey crop for the rest. Occasionally we can get comb drawn out in sections when there is not enough honey coming in to be stored in them, and thus make valuable headway for the harvest in front; but it is not always a success and often an injury, as bees very often, instead of building up the foundation, remove it entirely, but this is generally in a dearth of honey or during wet weather, and can be guarded against if we are careful. Such sections often prove valuable as baits in order to start hives that are difficult to get into supers, as very often happens when working for comb honey, but in general practice they have not the fine appearance of sections that are filled and removed during the flow. With extracted honey the case is quite different, and the more we can induce our bees to draw out extracting frames when honey is scarce proportionately will they increase the quantity stored when the flow does start. Fortunate indeed is the bee-keeper who has two or even three racks of drawn comb for every hive he is working for extracted honey. It may cost him more in initial outlay than if he removed his frames, extracted and replaced them, to be refilled as soon as each rack was completed; but the outlay is soon got back in honey both in regard to quantity and quality. With, say, three racks of frames for each hive we can always keep our bees working at full pressure, and with no loss of time keeping our bees waiting until combs are extracted, work goes on more smoothly. If honey is coming in freely and an empty rack of frames put under the half filled ones the honey is ripened thoroughly before being kept, and the longer it is left on the hive the finer the flavour. This can only be accomplished where a liberal supply of frames are in use, as other-

wise we waste the time of our bees unless it happens that we are at the end of the flow or a period when honey is temporarily "off." Another great advantage in a good stock of extracting supers is the fact that they can be dealt with at the bee-keeper's convenience, either as to time of removing or extracting, a vital point to a busy man.

In the above notes I have touched on one of the more important items that help to increase our honey crop and incidentally our credit balance on that asset. There are many others I hope, with our Editor's kind indulgence, to touch on later, which, if not quite so important, are all means to an end.

In terms of Regulation 23, Proclamation 58, 1903, it has been notified that, in lieu of the employment of the reducing factor 4 for timber in the Qudeni Forest, the factor 9 will be employed for reducing by 10 per cent. the license value of individual trees, provided for by Government Notice published at page 288 of the *Government Gazette* of April 6th, 1909.

Unless under very favourable circumstances, it is exceedingly difficult to get a growth of grass from the seed on a bank sloping at an angle of even fifteen degrees, because a heavy shower of rain on the sloping bank would run off the fresh soil before the young grass had formed enough roots to mat it sufficiently to hold it in place. To remedy this, the following plan will be found to be most effective:—To an area of twenty by fifteen feet—300 square feet—or in that proportion, be the area large or small, take two quarts of lawn grass seed and mix it with four bushels of rather stiff soil, to which add two bushels of cow-manure. Mix the whole with water to the consistency of thin mortar. This mixture is to be spread on the sloping bank, first having scratched the surface of the bank with a rake. It should be applied as thinly as will make a smooth and even surface—in short, just as plaster is spread on a wall. . . . It will be necessary, until the grass has fully covered the surface, to keep the plastered bank covered with hay or straw to prevent the plaster from drying or cracking. If the weather is dry a watering will hasten its growth; if sown at a season when the temperature will average seventy degrees, a green sward will be obtained in fifteen days.—PETER HENDERSON (*"Practical Floriculture"*).

Division of Agriculture and Forestry.

PROGRESS REPORT FOR NOVEMBER.

THE Acting Farm Manager, Mr. W. C. Mitchell, surveys farming operations at Cedara during the past month in the following report:—

Owing to the large number of stock on the farm that have to be wholly or in part stall fed it is found necessary to devote a considerable portion of the cultivated area to fodder crops, which will in addition to affording a supply of food for winter use provide, in addition, green feed for present consumption. With this object a large acreage on the eastern hillside overlooking the vlei has been planted with Japanese millet. Most of this is already above ground, but owing to the hot, dry weather experienced shortly after planting the crop appears somewhat patchy. Several acres of soy beans have been planted and are now in the scuffling stage. With an average oil content of 17 per cent. this, as a grain crop, is of no little value for feed purposes. About 15 acres of veld have been cut for hay, and, although the earliness of the season necessitated the yield being somewhat light, favourable weather enabled me to secure the crop in very excellent condition. The Algerian oats grown as a winter forage crop in the northern vlei have been cut, bundled and carted into sheds. Here again weather favoured us and the crop was of excellent quality. The general appearance of this crop when standing in the field and seen adjoining a similar area planted with winter turf oats was very significant, the latter being completely spoilt by rust whilst the Algerian maintained its reputation as a rust resister almost unscathed.

A feature of the work during the month has been the steam plough cultivation, the traction engine having been employed with two Ransomes' and Simis' disc ploughs carrying three disc each and one Howard's 3-furrow mouldboard. I should like to specially mention the excellent work done by the students employed with these machines. A day of 16 hours was divided into two shifts, work being commenced at 4 a.m. and ending at approximately 8 p.m. daily. This, of course, necessitated a heavy strain on the engineer, who was present every evening with the gang till knocking off time.

On the 24th instant we were honoured by a visit from the Hon. the Minister of Agriculture, the Minister for Railways and Harbours and some 20 other members of the two Houses of Parliament. A hurried inspection of all branches of the farm appeared to give general satisfaction.

Garden work has proceeded as usual during the month, sowings having been made of lettuce, celery, cauliflower, carrots, beet, beans, marrows, parsnip, etc.

STEAM PLOUGHING.

A feature of practical tuition during the month has been a training afforded to a number of students in the management of the steam ploughing outfit, and the Farm Engineer wishes to commend certain of his assistants by name.

Steam ploughing was started on the 10th, and, after the ploughs had been set, the following students were entrusted to look after the engine almost entirely on their own responsibility:—Morning shift on engine, Nicholson and Grey; afternoon shift on engine, Sedgwick and Beviss. Nicholson and Grey performed their duties as driver and stoker beyond my expectations and only one slight accident was recorded against them, namely, the breaking of the wire rope. Sedgwick and Beviss also performed their duties well. I would therefore wish to recommend that Students Nicholson and Sedgwick receive a special prize as charge-men, and Grey and Mingay as careful assistants. The others tried on the engine as drivers and stokers did very well indeed, in order of merit—Bevis, Sparks, Dansie and Sangmeister.

Charcoal made on the farm was tried as an experiment mixed with part of our first consignment of coal received from the Government Railway Stores, Durban; first of all with a good foundation of live coal, with an undoubted reduction in amount of clinkers formed. It was then decided to try charcoal alone, but this was found to be of no use. Two hours were spent on this last experiment and during that time it was impossible to keep up 100 lbs. of steam, with or without the blast. It was decided therefore to revert to the mixture of coal and charcoal, which undoubtedly proved the best medium for steam-production.

WOOL EXPERT'S REPORT FOR NOVEMBER.

Mr. J. J. McCall, Government Wool Expert, reports:—

On the 1st of the month I completed the dipping of all the sheep in Cooper's Dip and put them into fresh pasture. On the 3rd I accompanied a party of eight students from the College to Durban, where we attended the wool sales at Messrs. Reid & Acutt's Wool Mart. I have already handed you a special report on this visit. From the 16th until the 20th inst. I was in the Ixopo district giving demonstrations in the handling of wool. On the 29th inst. I proceeded to Greytown district, where I gave another demonstration to the Upper Umvoti Farmers' Association. All those demonstrations were well attended, and I was gratified to find that my endeavours were highly appreciated by those interested. I have been strongly urged to keep the two appointments already made for the 5th January, 1910, and 2nd February. I was intending to cancel either one or both of those engagements, but I am afraid such action would give offence if carried out. I would suggest that my programme be adhered to.

On my late visit I was accompanied by Student Reid, who evinced great interest in all that he saw pertaining to the work amongst sheep and wool. During the month I have had three students assisting me. The first week was taken up in repairing fences. On the 8th I inoculated against Blue-tongue 55 sheep as a preliminary test before operating on the whole flock. There were 58 sheep under observation (three of them uninoculated), 8 Hampshire ewes, 19 Merino ewes, and 31 Lincoln ewes. On the ninth day after inoculation I had the whole 58 temperatured, and continued to do so during the succeeding two days. I append the results:—

	17th		18th		19th	
	Max.	Min.	Max.	Min.	Max.	Min.
Hamp ewes ...	106.4	105	105.8	104.6	105	103
Merino ewes ...	106.4	104	105.2	102.2	105.6	101.2
Lincoln ewes ...	106.5	103	105.2	103	106.2	103

(The three uninoculated sheep were always normal).

All the inoculated sheep reacted, and on the 23rd the whole lot looked completely recovered. On the 26th two of the Hampshire ewes aborted their lambs owing to the inoculation, but I am at a loss to understand why they did not do so earlier. One of those ewes developed symptoms of pneumonia and is now very sick. The other, although fallen away in condition, is apparently healthy. I am dosing two Hamps with "Sanitas" in an attempt to cure their lung trouble, which has pulled them down very considerably.

I have now completed the inoculation of all the sheep which I intend to do at present. I have not yet inoculated any of the rams, as I prefer to wait until they come out from the ewes. The haired Persians I have also left undone as they are now lambing. I have 77 Lincoln ewes with the newly purchased Lincoln ram. The Merino ewes I have separated into the three grades and put the different rams in with each lot. I have also put Merino rams with the balance of the Lincoln ewes. I have a non-descript troop with the three woolled Persian rams, consisting of 6 Hamps, 6 Lincolns, 62 Merinos, 3 woolled Persians, 10 Shrops, and 2 Devons.

In each flock I have left a few sheep uninoculated as a test, *viz.*:—

Lincolns ...	...	Inoculated	363	...	Not	15
Merinos ...	...	"	462	...	"	14
Hamps ...	...	"	90	...	"	6

Each inoculated sheep has been branded red circle on the rump.

I am experimenting with Holmes' Liquid Dip, as I find that Cooper's does not keep the tick away for more than about two weeks at the longest. It kills all ticks that are on the sheep, but it does not prevent fresh parasites from again finding lodgment on the bare skin of the legs, tail, etc. From correspondence which I have submitted to you, you will remark the danger attached to dipping in Cooper at close intervals. I was not unaware of this danger as I have had practical experience of its de-

structive qualities when not used strictly as at present directed. When I have given Holmes' fluid a fair trial I shall compare results for your information and my own guidance.

DAIRY WORK.

The Dairy Instructor reports that all students have received during the past six weeks a course of instruction in cheese-making. The weather left much to be desired during the conduct of this work, being hot and sultry. It is hoped, however, that a stock of very good Cheshire cheese has been obtained.

WINKEL SPRUIT EXPERIMENT FARM.

The Manager, Mr. W. Johansen, reports that with the exception of cane-cutting and tree-planting no other than the ordinary routine of farm work has been done during the month of November. We cut and sent to the Illovo Mill 633½ tons for the month, but the roads got so bad owing to continuous rains that we found it impossible to keep on and have left about 300 tons still standing in the fields and which we will take off next June.

We have sent to Illovo Mill 1,413 tons 1,228 lbs. and to Isipingo Mill 284 tons 1,840 lbs., or a total of 1,698 tons 1,068 lbs. from the Farm this season.

With the exception of a few acres left for wattles practically the whole of the land cleared along frontage to railway has now been planted with varieties of trees both ornamental and useful.

Mules and all other stock are doing well.

ORCHARD WORK.

The Government Orchardist, Mr. C. B. Parsons, reports:—

Work for the month included a large amount of attention to the strawberry beds, revenue from fruit picked amounting to £22 odd. Towards the end of the month the beds suffered much from drought with a corresponding decrease in the daily picking and size of the berries. Instruction was given to students in grafting, and other nursery work, summer pruning, winning, etc. All citrus trees have been manured. Weeds in Western Orchard cut, and a fair amount of hoeing done. In the majority of cases good growth is being made by trees, with the exception of some few peach trees which have started very unevenly. A nursery of young peaches has been planted out, but the excessive hot and dry weather has militated against their growth.

CROWN FORESTS.

The Chief Forest Officer surveys work in Crown Forests during November in the following report:—

The drought is the prevailing note of the month's reports from most forest stations. Its effect upon the woodlands is marked by the decrease in the rate of growth of seedling trees, Forester Chilvers at Ingeli observing this in the case of yellowwood to be exactly half of last year's rate. At Hlatikulu, Mooi River, Forester Mason notes forest trees to be languishing and faded for want of water and the bush springs to be so dry that the game have to go to a distance to drink. It is curious that while drought is reported from Qudeni and the Pongola Forests, as elsewhere, at 'Ngomi—which is between the two stations—much rain has been experienced, and natives' crops are well forward. At 'Ngoya and Empangeni fair rains are reported, and severe storms at latter and at Entumeni on 17th November. You will observe therefore that though the unseasonable drought has not spared the forest belt, it is portions only of that belt that have escaped it out of the whole of the Colony.

During November, Foresters have been making a careful inspection of beacons and boundaries with a view to furnishing the information you require as to re-surveys necessary. The reports are not yet complete, but the attained results show very plainly the great advantage of sunk monoliths over cairns as beacons. It would have saved a pretty penny if the former had always been insisted upon wherever possible. Where not possible the method I follow to save the expense of monoliths, marks the sites of cairns for a practical eternity: a trench cut in the form of a circle or segment of a circle—according to the number of boundaries meeting at the beacon—round the site, with others on the true lines, cut from the beacon to the circular trench at radii. Foresters to whom it is not urgent to issue this instruction will please note the foregoing for application when required, as they will be held responsible for any re-surveys necessitated by loss of beacon marks of forest areas in their charge. The plan of placing a few loose stones on beacon sites, as reserves of ammunition for herd boys or wheel props for wagon drivers, is profitable only to surveyors and lawyers.

Forester Tustin reports an enquiry for some thousands of railway sleepers at Impetyene, but says that sneezewood, stinkwood, and ironwood are named. Such hard woods seem unsuitable for the purpose, both on account of their costliness and their want of resiliency: ironwood especially would prove about as hard as stone. Sneezewood costs 1s. the cube foot standing in the bush before an axe is laid to it, and so does stinkwood, while yellowwood may require creosoting. I should recommend lemonwood and waterwood mainly, samples of other kinds being taken (marked by the Crown Forester with number of tree in section lists) ex-

perimentally. Such marking would be in tar, on sawn ends of sleepers other than lemonwood and waterwood, for identification of species. Enquiries have also been received from Maritzburg and Durban by Forester Chilvers, with reference to his paper on the seasoning and characters of our native timbers in the October number of the *Agricultural Journal*. One of these enquiries dealt with the supply of timber from Crown forests generally, and I replied to it myself with information in accordance; the other referred to tobacco-pipe woods, and Forester Chilvers has been directed to deal with it and report.

Forester Green, of 'Ngoya, in a supplementary report, calls attention to the great loss of revenue by not charging for 'ncema rushes. Those at the Umlalazi and Umhlataze Rivers are of a quality greatly sought after by natives. At Red Hill, in Natal Proper, this article is the sole source of revenue, and there is good reason for making it contribute in Zululand. In the long run a moderate charge is in the interest of the natives as protective of a commodity exposed to spoliation: the ilala palm is a case in point, and you are aware how that is being destroyed in Zululand.

Forester Leigh is planting out cluster pines at Entumeni. Forester Surridge has a case against a native for cutting trees in the Ingudwini Forest, Upper Umkomaas. This may prove to be a serious case of contravention of Proclamation 58, 1903, similar to another tried at Bulwer during November, which resulted in a fine of £15. With regard to this latter case Forester Purser reports that the accused—a native who had applied for some fallen trees—took advantage of the Forester's absence at 'Ngoya to fell several standing trees in the Ngonigoni Forest—recently demarcated but known to him to be Crown forest. The Ingudwini is one of the oldest demarcations in the Colony.

In the Bulwer Forest district leopards destroyed about eighty sheep, and, acting on your permit to a resident, Forester Purser organised a great hunt with about 100 natives and more dogs from Ingelabantwana Forest to the Marwaga Mountain. The latter, however, affords too much cover in its innumerable fissures, and no bag was made. Acting Forester Boast reports having taken five more eland calves to Cedara from Giant's Castle. Forester Foster notes the presence in the 'Ngomi Forest of bees similar to the Italian, as well as the ordinary bees of the country. It would be interesting to further investigate this. He is starting a few hives at his station, and will be able to report further facts of interest to apiarists as well as to reduce his living expenses thereby.

AFFORESTATION.

The Chief Afforestation Officer, Mr. F. Stayner, details work in his section for the past month:—

The continuance of drought throughout Natal has necessitated extension of felling and other dry season work; no planting of magnitude has been undertaken. The burnt *Cupressus lusitanica* (Cedar of Goa) in the main avenue has been taken out and replaced with healthy stock, the *Cupressus torulosa* (Twisted Cypress) so lost has been replaced with *C. lusitanica*, no *C. torulosa* being on hand in the nursery.

The bark of *E. obliqua* plantation felled from 5 feet by 10 feet to 10 feet by 10 feet has been saved at the suggestion of a prominent firm of nurserymen and seedsmen with view to exploitation as packing material. About 20 tons have been dried and experiment will be made in shredding it as soon as the engine (now ploughing) is available. Government East Coast Fever regulations anent grass for packing insure a good demand for this bark material.

Mr. Ballenden, a former student of the School of Agriculture, has accepted the vacant position of Second Assistant Forester, and resumed duty on the 16th inst.

Five students have been employed on the forestry section. Wattle-stripping and nursery operations have afforded ample scope for their energies.

The very hot winds, which have been such a feature in the month's weather, have made watering in the nursery a heavy task; on some days, recently pricked off seedlings have to be gone over with the can thrice. A visitor to the Farm, evidently bent on criticism, remarked on hearing this, "What a waste of labour; why not drench them well the first thing in the day?" It is the kind of idea which renders nurseries so necessary and failure to raise plants from seed so frequent. Empangeni Forest Station has been more fortunate with regard to rain 4.88 being recorded. Sales of transplants do not produce much at Empangeni at present, and catch crops of mealies and potatoes are having attention with a view to bringing in cash. Owing to previous laxity for years past natives have used the Empangeni plantations as highways and byways to whatever point they have wanted to go in the neighbourhood, and Forester Tarboton has checked this. Some time back he prosecuted a native, whom the Magistrate warned and discharged. This month he took another offender to Court, with the result that a heavy fine was inflicted. I trust that trespassing will now cease; it is not that natives do great damage in passing through the farm, but their known carelessness with respect to fire makes their presence undesirable.

Forester Foster too reports good rains, 5.18 being the amount recorded at Ngomi. He is proceeding with the preliminary nursery operations instituted there.

E. R. SAWER,

Director, Division of Agriculture and Forestry.

Central Experiment Farm, Cedara, 15th December, 1909.

The Position of East Coast Fever.

OUTBREAKS DURING NOVEMBER AND DECEMBER.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 19th November to 17th December:—

Dundee Division.—Outbreaks on the farms “Wilderness,” east of the main line and north of Dundee-Vryheid, “Burnside,” west of main line, “Craigielea” (sub-division of “Dewaar”), east of main line.

Weenen Division.—Outbreak on the farm “Seotspoort.”

Umroti Division.—Outbreaks on the farms “Seven Oaks” (sub-division of “Langerwacht”), “Sophiadale,” “Welverdiend,” “Kleinfontein,” “Viras Pride” (sub-division of “Rust”), “Mount Helen” (sub-division of “Wonderboom”), “Carlton” (sub-division of “Groot Reit Vlei”).

Alexandra Division.—Outbreak on the farm “Mount Lewis.”

Klip River Division.—Outbreaks on the farms “Kleinfontein,” east of main line, “Doornpoort,” west of main line, “Doornkraal” west of main line, “Walker’s Hoek,” west of main line.

Krantzkop Division.—Outbreaks on the farms “Broeders,” “Lots Hoek.”

Lion’s River Division.—Outbreaks on the farms “Hawkstone” (sub-division of “De Ronde Kop River”), east of main line, “Allerthorpe” (sub-division of “Alleman’s Drift”), east of main line, “Craignethan” (sub-division of “Wetevreden”), west of main line.

New Hanover Division.—Outbreaks on the farms “Camelhoek,” “Cramond,” “Maria” (sub-division of “Vogel’s Vlei”), “Uitvlugt.”

Camperdown Division.—Outbreaks on farms “Strathfieldsaye,” “Honig Krantz,” “Umblaas,” “Cleveland Hill” (sub-division of “Lange op Dravende”), “Lange Hoop,” “Oak Vale” (sub-division of “Bredasfontein”), “Leeuwpoot,” “Inanda Location.”

Richmond Division.—Outbreak on the farm “Bridley Manor.”

Isopo Division.—Outbreak on the farm “Waterfall.”

Estcourt Division.—Outbreak on the farm “Berg Vleit,” west of main line.

Umgeni Division.—Outbreaks on the farms “Cliff View” (sub-division of “Reit Spruit”), “Ellybank” (sub-division of “Slangspruit”), “Buchan Farm” (sub-division of “Brasfort Park”), “Inanda Location.”

No record is kept of outbreaks in the following Magisterial Divisions:—The whole of the Province of Zululand, the whole of the Victoria County, Umsinga, Vryheid, Ngotshe, Babenango and Paulpietersburg.

Exchange Reviews.

WHAT OTHERS ARE THINKING AND DOING.

FROM statistics given in a bulletin of the Italian Ministry of Agriculture it is shown that the chemical fertilisers prepared in Italy are principally superphosphates and sulphate of ammonia. Of the former, about 800,000 metric tons of mineral superphosphate and 50,000 metric tons of bone superphosphate were produced in 1907. Of sulphate of ammonia about 10,000 metric tons were produced as a by-product of the gas industry and 100 metric tons from other sources. Of organic nitrogenous manures there was probably produced about 40,000 metric tons. There were in 1907 82 factories in Italy for the preparation of superphosphates, supplying practically all of this material consumed in Italy and a certain amount for exportation to neighbouring countries. The sulphate of ammonia produced is about half of that required. In addition 41,900 metric tons of nitrate of soda, 7,000 metric tons of potash salts, and 100,000 metric tons of Thomas slag were imported during 1907.

Wax from Sugar Cane.

In a recent issue of the *Journal des Fabricants de Sucre*, translated by the American *Beet Sugar Gazette*, the author writes: The utilisation of the under-products of the cane sugar industry, which until recent years has been limited to the transformation of the molasses into alcohol and to the use of the defecation scums as a fertiliser, is at present the object of experiments which seem to lead to very interesting and practical results. For some time already, several planters have succeeded in preparing, from ground bagasse and molasses, a valuable food for cattle. In Trinidad, Mr. L. Bert de Lamarre has successfully established a manufacture of paper paste from bagasse. In Java, very original researches have been undertaken in view of the extraction of the wax of the sugar cane from the defecation residue. Professor Dr. E. O. Von Lippmann has recently analysed in *Die Deutsche Zuckerindustrie* a remarkable thesis of Dr. A. Vijnberg on the cane wax and its technical extraction, from which it appears that the defecation scums contain not less than 10 or 12 of wax per 100 of solid matters. Exposed to the action of the air for some time, these scums undergo a kind of fermentation which destroys the greasy matters and facilitates the extraction of the wax.

Practically the operation takes place as follows:—The scums in heaps are exposed to the fermentation, after which they are dried, either by the sun heat or in a Huillard dryer, and broken into small pieces.

Then they are treated by benzine in order to extract the wax. All the implements required for this work are simple, have been known for a long time, and their use does not present any difficulty. As to the profit of the operation, there can be no doubt about it according to the estimates of the author, since the "carnauba wax" (extracted from a palm tree which grows in abundance in North Brazil), of which 4,000 tons are produced every year, is quoted from 180 to 300 marks per 100 kilos (from £100 to £125 per ton of 2,000 lbs.). Besides this the exhausted scums are just as valuable as before for fertilising purposes; it would even be possible, after eliminating the grease and the wax, to extract the sugar left in them in appreciable quantities.

Pig-Feeding Experiments.

The Agricultural Experiment Station of North Dakota has recently issued a bulletin (No. 84) giving the results of fattening trials with pigs. The object of these trials was to compare the value of barley with maize for fattening swine and to determine the difference in quality of the pork produced. Incidentally a comparison was also made of the gains produced by different cross-bred and pure-bred pigs. From the results of this trial it is concluded that ground rejected wheat is capable of producing good gains when fed to swine in connection with shorts; that in comparison with maize it requires 8.9 per cent. more rejected wheat than maize to produce the same gains; that the quality of pork produced is even better than that produced by maize; and that if pork is selling for a reasonable price, a fairly good price may be expected from feeding the rejected wheat to swine.

Favourite Breeds of Pigs.

The opinions of 30 Victorian pig-breeders were given recently in the *Australasian* and have been quoted by Mr. W. Smith, Pig Expert of the Victorian Department of Agriculture in the monthly journal of the Department for October. Fifteen favoured the Yorkshire and Berkshire cross; eleven, pure Berkshires; two, a cross between the Tamworth and Berkshire; and one, a cross between the Yorkshire and Tamworth, doubtless the Tamworth which at one time was preferred in Victoria to all other breeds. It has, however, receded in popular favour, because it showed a tendency to weakness of constitution brought about by in-breeding. Crossing with a Yorkshire appears to give stamina and rapidity of growth to progeny.

An interesting point brought out in the discussion is the relative gain in using a Yorkshire boar with Berkshire sows in preference to a Berkshire boar with Yorkshire sows. With the Yorkshire boar there is

a great advantage that all the young ones will be white, and of fairly good type: the cross used the other way, that is to say, a Berkshire boar and Yorkshire sow, gives pigs of all colours—some white and some black, others spotted, and a number untrue to the type of either parent. On the other hand, several contributors point out that the Yorkshire sow is a better mother than the Berkshire, and raises larger litters successfully. In using the Yorkshire as pure breeds, or in crossing, Mr. Smith prefers the middle Yorkshire, which is a quick grower and better shaped and more hardy for this climate as he grows plenty of hair, and has a finer skin than pigs of any other breed. With respect to the age at which pigs should be allowed to breed opinions were almost unanimous, *i.e.*, that sows should not farrow before they are twelve months old.

Oats for Sheep.

The methods of management and the benefits and profits likely to accrue from feeding oats to sheep cannot be stated in a general way, as much depends on the breed, health, degree of condition, and the price paid for the sheep when bought. Discussing the question of oats for fattening sheep and lambs, Mr. W. H. Ham, the Sheep Expert of the Department of Agriculture of Victoria, gives some interesting and useful suggestions in an article in the October number of the *Victorian Journal of Agriculture*. *Inter alia*, he remarks that half a pound of oats per day will keep an average sized sheep going well, providing good water is available. If there is a fair picking of grass as well, they will steadily fatten. The larger the sheep, and the more its disposition is to put what it eats into wool-production, yolk, etc., the more feed and longer time it takes to fatten. Merinoes as a rule are not suitable for this method of fattening. They are wilder for one thing, and a great many station cull lots are badly shaped and yolkly woolled, and never fatten. The skins of good merinoes, especially when fattened on natural pasture, are most valuable, and assist in selling the sheep; but when fattened at feeding troughs, the dust and the rubbing due to jostling lessen their skin value to a considerable extent.

Troughs for feeding oats to sheep should be fully 12 inches wide, and the sides 4 to 6 inches high—the width allows for carelessness of lads and general farm hands when emptying oats into the troughs; this width also allows sheep to feed facing one another. Some farmers use old railway sleepers—one laid on its flat and one each side on edge, and kept in position with short stakes. It is usual to allow twelve inches to the sheep: 50 feet will allow 100 sheep to feed. If sheep are to be fattened exclusively on oats, it will take 1½ lb. to 2 lb. per day to fatten a thick-set 60-lb. cross-bred. The thicker set they are the less time they

will be fattening; long-legged, narrow-framed sheep take longest to fatten, all else, such as health, etc., being equal. If these 60-lb. sheep be bought very poor, it will take fully ten weeks to make them fat, and fourteen weeks to make them prime; it will take longer in winter, and less time in warmer weather. If the sheep are at all unhealthy, the fattening period will be longer still. For an average period of twelve weeks, they will eat about 4 bushels per head. One of the ways that feeding will pay is in buying up good sorts of cross-bred lambs or weaners in the wool. In Australia, during October, November and December many lambs of suitable quality for freezing may be obtained. These should be shorn and then fattened; the wool will in most years average 3s. to 4s. per head. Aged ewes, if fed well, are the best mothers. It will not pay farmers to buy young cross-bred ewes to turn on fodder crops. Graziers can give more for these, as they can raise a fair lamb and a good fleece per year from off natural pasture. It is only when becoming too aged to thrive on scanty feed that they can be sold to farmers at a price to pay for cat feeding and finishing off finally on fodder crops.

Stone-Gathering Machines.

A bonus of £100 was offered some time ago by the Government of South Australia for the best machine for gathering stones; and the results of a trial of such machines are recorded in the *Journal* of the Department of Agriculture for October. Five machines took place in the trial: and in judging them the following points were taken into consideration, *viz.*, (1) Efficiency, (2) gathering stones free from soil, (3) cost of clearing, (4) lightness of draught, (5) strength of machine, (6) simplicity of construction and working, (7) cost of machine. The judges in their report state that none of the machines did work of a satisfactory character, and they were therefore unable to recommend the payment of the full amount of the bonus offered by the Government, but as two at least of the machines promised, with slight structural alterations, to be fairly effected, they recommend that small bonuses be granted to the makers of those machines and that a further trial for the balance of the bonus offered be held early in 1910. The judges strongly recommend intending competitors at any future trial not to attempt to pick up the stones, as gathering them into rows or heaps will meet the requirements of the farmers.

Egg Production.

Discussing the marketing of eggs in the September number of the *Victorian Journal of Agriculture*, Mr. H. V. Hawkins, the Poultry Expert of the Department of Agriculture, gives a list of "Essentials necessary in producing good eggs." His list is as follows:—(a) Hens that produce 180 to 200 eggs yearly. (b) Hens that produce eggs of 2 oz.

weight on the average. The breeds already mentioned may be expected to do this. (c) Good housing, regular feeding and watering, and clean, dry nests. (d) Gathering eggs daily. When the temperature is above 80 degrees gather twice daily. (e) Confining broody hens as soon as discovered. (f) The rejection, as doubtful, of all eggs found in a nest not visited the previous day. Such should be used in the home. (g) The placing of summer eggs, as soon as collected, in the coolest place. (h) The prevention, at all times, of moisture in any form, coming in contact with the egg. (i) The disposal of the cockerels before they get among the hens. Also, the selling of old male birds, or confining same from the time of hatching is over until required again. (j) The using of cracked and dirty eggs in the home. (k) The marketing of all eggs at least once each week, oftener if possible. (l) Keeping eggs as dry and cool as possible when *en route* to market, or when stored. (m) Keeping eggs away from bad odours, or musty cellars. (n) The use of strong, clean cases and good fillers.

The Destruction of Weeds by Insects.

An interesting account of the introduction of insects into a country for the purpose of destroying a noxious weed is given in the *Hawaiian Forester and Agriculturist* for August last. In 1858, a plant known as Lantana, which belongs to the same genus as one of the wild sages of the West Indies (*Latana Camara*), was introduced into the Hawaiian Islands from Mexico as an ornamental plant. This escaped from cultivation, and, owing to the absence of its natural enemies, and the dissemination of the seeds by a bird which had actually been introduced for the destruction of caterpillars, it became a serious weed in pasture and in sugar lands. In 1900, the Entomologist in the islands conceived the idea of introducing some of the insect pests of the plant from its native country, Mexico. This he did, and insects have been acclimatised which attack the branches, leaves, flowers, fruits, and seeds of the Lantana, with the result that it is quickly being brought under control. A grave danger exists, however, in the employment of such a method of dealing with weeds. The insects that are introduced must only be of such kinds as have very specialised habits and food plants, in order that there may be no chance of their adapting themselves in such a way as to obtain shelter or sustenance from valuable plants that already exist in the country to which they have been brought.—(*Agricultural News*).

Mange in horses is a sure sign of neglect and dirt or injudicious feeding.

Farm and Garden Notes for January.

By GEO. CARTER, F.R.H.S.

VEGETABLES FOR WINTER.

THERE is no reason why you should be satisfied with pumpkins and potatoes during the coming winter. I know that these are the usual vegetables on our farmers' tables for four or five months of the year, certainly during the winter months, and one can imagine with what regular monotony these two items, varied just now and then with a little rice and beans, appear each day. I have nothing to say against a nice pumpkin, especially if served with the rich brown gravy of the Yorkshire folk. And one cannot reasonably object to a well-grown and mealy potato. But there is something in one which rebels against monotony in anything; and it is the monotony, not the particular dish served, which palls on one. If it is necessary well and good. But it is not necessary.

That winter dinner table, however, must be brought to mind now, this month, and, if it is to be well furnished with variety of vegetables, the first work to that end must be done at once. That may be thinking six months ahead. Our farmers are quite used to such thinking, I know, but the "thinking cap" is seldom put on in favour of such a *small* thing as the vegetable garden. I often hear the excuse of "my farm is my garden," or "a farmer has no time for such little things." 'Tis curious how the same farmers find lots of time to grumble energetically at the quality of his dinner. Now, be fair to the one who is responsible for that dinner, and spare a boy for a day or two to dig, and provide something to make a dinner. Here are a few things you must put in this month:—

BEETROOT.

This should be sown in drills, an inch deep and a foot apart, and the soil firmed down over the drills. If your soil is shallow sow the Early Model, a globular kind. If there is plenty of depth the long Covent Garden is the best.

KALE.

The Scotch Kale, or Curled Borecole. A few lines of this excellent vegetables will stand all the winter in the coldest districts, and is all the sweeter for a touch of hard frost. The culture is the same as for cabbage.

BRUSSELS SPROUTS.

We used to think this vegetable a complete failure in Natal, but I saw a most excellent crop at Mooi River last winter which quite disproved it. This crop was sown in January, and was as perfect as any I have seen in Europe. Sow and treat the same as cabbage.

CABBAGES AND SAVOYS.

For the coldest districts a Drumhead Savoy is the best kind of cabbage to grow. Nothing is sweeter, and after a frost they are all the better. The more commonly grown Drumhead cabbage is rubbish by comparison. The type chosen, however, should vary with the climatic conditions. Below Rosetta the Enfield Market, for the Midlands proper the Cape Sugar Loaf, Oxheart and Nonpareil.

CAULIFLOWER AND CELERY.

Cauliflower and celery should already be planted out, but there is yet time to get good results. The long, serious drought must have destroyed many beds of seedlings, and prevented any planting out up to now. In cauliflower it would be best to now sow Early London or Erfurt and the White Plume celery.

SPINACH.

There are two kinds of this. One is called "Winter," the other "Summer." But I have yet to discover why these names have been given. Both are suitable for all the year round sowing, and both of equal quality. They differ in the shape of the seed, but not in utility at any time of the year. Now, one is always told to sow this seed very thinly. That is certainly a mistake, for no self-respecting "cut worm" will pass a young Spinach plant, and my experience is that all the cut worms in the garden collect at that one bed for a glorious feast. Therefore, I say, sow the seed *thickly*, half an inch deep, and remember that this seed germinates best if the soil is well firmed down over it all along the lines. As soon as the seedlings are past the "cut worm" stage, thin them out to fifteen inches apart. If they have plenty of room the leaves develop properly and are thick and fleshy, and this is what one wants.

TURNIPS.

For the cold districts January is a good month for a main crop sowing of the table varieties. In the warmer districts better wait until February. Sow in drills half an inch deep, and a foot apart, and eventually allow each plant quite a square foot. If you have plenty of space let the drills be twenty-one inches apart. Most garden turnip beds are so crowded that only one root in a hundred gets a chance to bulb out. The rest are strangled to death. The choice of varieties does not matter much. The Jersey Lily and Snowball are the favourite kinds; while just a few people still have a liking for a good yellow-fleshed swede, such as we used to have cut up into inch squares and cooked in the mutton broth on the farm at Home.

I know many of our readers will object to the sowing of all these vegetables on the ground that water will be scarce in the winter. It is not every farmer who has a stream of water running through his garden. But I would point out that, if the planting is done early, most of the

above-named vegetables will get well rooted, and will then stand a good deal of drought during the winter.

FLOWERS FOR WINTER.

In the flower garden the same reasons for forethought apply, and one has to face the same difficulties as for the vegetable garden. And in addition one has to think out how to make the best of sheltered nooks and corners for the more delicate flowers, which would perish in the open, but are quite safe and snug when sheltered from the cold west wind. A few varieties, such as Pansies, English Daisies, Golden Feather for edging, and Stocks, should be sown in boxes, to be transplanted at the end of next month, and perhaps a little earlier if progress is rapid. Most of our winter flowers, however, are to be sown right in the border where they are to flower—sown thinly, and then thinned again so that each single plant has enough room for full development. *Snapdragons* are always useful, and bloom in about four months from the date of sowing. *Candytuft*, both the white and coloured, should be sown regularly once a month for the next three months. The old English *Mangold* (*Calendula officinalis*), should be sown in succession also. Carnations (Giant Marguerites), Cornflowers, Dianthus (Indian Pinks), Eschscholtzias, Larkspurs, Lupins, Phlox Drummondii—all these will stand a lot of cold, and will always bloom profusely throughout the winter. A large sowing of Mignonette should not be forgotten, and Wallflowers.

Then, for these sheltered corners I mentioned, and on borders sheltered by shrubs and trees, there is no reason why one should not risk *Agatheas*, *Caelestis*, *Arctotis*, *Brachycombe*, *Centaurea*, the annual *Chrysanthemums*, Cornflowers, *Gypsophila*, *Linum*—indeed, I could mention a dozen more excellent flowers which would keep the garden full of brightness, and the house rooms full of colour right through the winter months. The one thing needful is to avoid delay, and to get your seeds in during January and February, while there is plenty of rain and warmth to get the plants well ahead.

ROSES.

Some of the trees, particularly of the Teas and Hybrid Teas, should be pruned back a little (not heavily) this month. This method gives a wonderful show of autumn blooms, almost as good a show as the one we get in October.

TREE SEEDS.

We find January and February excellent months for sowing seeds of *Eucalyptus*, *Cyprusses*, and Pines. Sown now they have time to get the right size for planting out during the first good spring rain. The seed should be sown in flat half paraffin tins, or boxes, the depth of covering being proportioned to the size of the seed. Most of the gum seed is so small that only a very slight covering (one-sixteenths of an inch) is ample; while the larger seeded pines may go an inch deep without any danger.

Correspondence.

** * * Correspondence is invited on topics of interest to farmers. Letters should be written on one side of the paper only; and while a nom-de-plume may be used, all letters must be accompanied by the name and address of writer. The Editor is not responsible for the opinions of his correspondents: the letters which appear in these pages are published as the opinions of the respective writers, and their insertion does not necessarily imply editorial concurrence with the views expressed.*

HODDER PATENT WATER ELEVATOR.

WE have received a number of enquiries from readers regarding the Hodder Patent Water Elevator, an article regarding which appeared in our last issue. Enquirers are referred to the "Notes and Comments" in the present issue of the *Journal*.

THE LABORATORY DIP.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—I have been spraying my cattle regularly with the Laboratory Dip ever since the report of it by the Veterinary Department appeared in your valuable *Journal*, and have also found less favourable results in some instances. I notice, according to your *Journal*, that the compound is liable to considerable variance in its composition as to the actual amount of arsenic contained. I would therefore esteem it a favour if you would kindly furnish me through your *Journal* with the actual amount it should contain.—Yours, etc.,

Dalton.

H. D. DINKLEMANN.

[Investigations are now in progress at the Laboratory, and it is hoped to make known the results of these shortly.]

OPHTHALMIA IN CATTLE.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—The following is an extract of letter received from W. E. H. Maling, Esq., of Cedarville, one of the largest farmers in Griqualand East:—

"I have been using your dip for six months, and am very pleased with it. I started it for lice in cattle with surprising results. I have been very much troubled with Ophthalmia amongst my cattle for the last three or four years. It broke out again this year, and I was surprised to find that the spraying not only cured it but stopped further outbreaks."

I had to stop spraying for a couple of weeks, as I was altering my pens, and the Ophthalmia broke out again in that short time. There were no less than twelve calves affected. As soon as I started spraying again I stopped it."

Knowing that Ophthalmia is a disease common in cattle, and frequently occurs in horses and mules, I give you this information, and should you think it valuable, I would be pleased if you would insert it in your paper, and thus make it as widely known as possible.

The dip Mr. Maling refers to is Holmes' "Special" Cattle Dip, and is used in various parts for dipping and spraying cattle.

Personally I did not know that my "Special" Cattle Dip had such a beneficial effect upon the eyes, and the information is certainly worth conveying to every farmer.—Yours, etc.,

CHAS. W. HOLMES.

THE PRICKLY PEAR PEST.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—The question of how to cope with the prickly pear pest is a matter that is continually receiving attention in the South African press, and we therefore venture to address you on the subject, believing that what we have to say will prove of interest to many of your readers.

South Africa is not, of course, the only country cursed with the prickly pear, and we thought it might prove of interest and possibly of assistance to some of your readers, who may be unaware of the fact, to know that Cooper's dip is a recognised means of coping with the pear when only isolated plants or small patches have to be dealt with. That your readers may have the benefit of previous experience on this point, we quote below extracts from two of the many letters we have received from men who have successfully used Cooper's dip to cope with the pear:—

"We have been using Cooper's Powder for some time for destroying prickly pear, and have found it a great success. We have only scattered pear on this place, and simply make a cut in the leaf and put as much powder as would lie on a threepenny piece into the cut, using a pocket knife, and have not known it to fail."

"The Dip (Cooper's) has been successfully used for the destruction of this pest, it being applied as follows:—Cut a small piece off the highest branch of the pear and insert a teaspoonful of the powder (in dry form) into the standing plant where the cut is made. The Dip works right through the plant and down to the roots, rotting it away. The writer is of opinion that the Dip would destroy the pear if, by the use of a brush hook, the tops of the plants were cut off and the Dip applied by means of a spray at a strength of one packet to ten gallons of water."

Trusting that the information contained in these extracts may prove of assistance to some of the many who have to fight the prickly pear—We are, Sir, yours, etc.,

WILLIAM COOPER & NEPHEWS.

CALF COMPLAINTS.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Can you give me any information as to the best means of curing an ailment which the natives say affects calves hereabouts and which is amongst the calves on this station at the present time? It is on the tongue, and shows in the form of small black pimples on the surface, which, the natives tell me, after a time prevent the calf from sucking the cow and so cause death through starvation where the calf is very young. I do not recollect having seen this complaint in calves before, but my experience of stock-farming has been confined to the high veld, and it may be that this trouble is prevalent in the thorn country only.

The Kafirs say that they have seen many deaths in late years from this cause and that there is some chemical which can be used to rub on the tongue and remove the irritation or whatever prevents sucking.

What would this be? I should be glad to learn, as, of course, we do not want to lose any calves if we can prevent it.—Yours, etc.,

P.O., Impolweni.

T. J. ALEXANDER.

P.S.—I am informed that alum and bluestone is sometimes used to rub on the tongue. We lost a calf from hairball a few days ago. Can you inform me of the best means of preventing calves from this constant licking?

[If any further cases of the disease occur, we would recommend your communicating with the Veterinary Department, who would, if necessary, send a vet. out to inspect your calves. With regard to deaths from hairball, Mr. E. F. Harber, District Veterinary Surgeon, replies as follows:—"To prevent calves licking themselves is practically impossible, as it is a natural process; but licking to any great extent may be modified by placing a supply of salt in places to which the calves can gain constant access."]

COTTON.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Could you please let me have from the publications issued by the Department of Agriculture the following:—No. 11, "Poultry-keeping in a Simplified Edition for Farmers," also the report on Cotton, by A. N. Pearson. As regards this may I enquire whether Egyptian cotton has ever been tried in the Lower Tugela Division or anywhere on the Coast as an annual; if so, with what success?

I might mention that I found on my farm, Lot 15, Nonoti (Mission Reserve), two cotton plants of about three years of age growing in a

semi-wild condition. I forwarded a sample to England for a report thereon. I have had a reply estimating it at 10½d., but normally it should be 7½d. The proportion of seeds was just below 2-3rds, the staple irregular and rather coarse. I also received the advice to try the Egyptian as an annual in a rotation crop, and I shall be much obliged if you could let me have the desired information, and perhaps put me in the way of securing a few seeds for trial plots.—Yours, etc.,

M. BOULANGER.

P.O., Stanger.

[The pamphlet on Cotton, by Mr. Pearson, is now, we regret to say, out of print.—Egyptian cotton has been tried at the Winkel Spruit Experiment Farm, at Mount Vernon, and elsewhere, and samples were sent to the Imperial Institute by Mr. Sim for report. From the report upon these samples it would appear that the climate of the Coast does not favour the cultivation of Egyptian cotton. As a matter of fact, the Director of the Division of Agriculture and Forestry informs us, the experiment has been abandoned at Winkel Spruit, as a result of later and still more unfavourable results. In a note on the subject, Mr. Sawyer says: "Our energies are now being directed to the encouragement of cotton cultivation in the Northern Districts, where considerable success has been attained in the neighbourhood of Louwsburg, and particularly on the farm held by Mrs. Coetzee, Mooiklip, from whom seed of the Caravonica type could be obtained. This Australian cotton has surpassed others and is recommended for special adoption. Egyptian cottons are being cultivated on several farms experimentally, but it would be premature to give an opinion as to whether they are likely to replace the Australian forms." Should our correspondent like to try Caravonica cotton, he can obtain seed, besides from Mrs. Coetzee, from Messrs. S. A. Nathanson-Commandite, P.O. Box 261, Durban, who will also furnish instructions regarding planting, cultivating, etc. Messrs. Nathanson-Commandite distribute the seed free, under certain conditions.]

ABOUT WHITE ANTS.

Quite recently I discovered that a little 10-year-old friend of mine had under observation a termite colony within the confines of a screw-capped pint bottle. I was so interested, and thinking that his observations, upon the exactness of which he is quite decided, would appeal to many older and wiser entomologists, that I asked him to write me a letter telling me all about his prize. He has now sent me a fair transcript: much harder than anything was the lot of writing to be done, because there were so many things that "Mr. Fuller wanted to know."—C.F.

DEAR MR. FULLER,—I am looking out for some more caterpillars for you; but I shall have to climb up the wattle trees to get them because they go higher up as they get bigger. You have asked me to write a letter about my queen ant.

I found it during my July holidays in the middle of a hollow gum tree.

The hole was about two feet high from the ground. I dug the dry mud out with the head of a pick and a stick. I dug down the tree but found nothing but little ants and eggs, or cocoons. Then I poked up the tree above the opening, and dry mud and ants fell down. The ants bit me. Then I saw a piece of dry mud just like a queen's cell, so I broke it open carefully and found the queen inside. It was a small one about $1\frac{1}{2}$ inches long. I put it in a empty sweet bottle. I put some little ants in with the queen, and pointed the cell together carefully. I put a part of the hive in with the cocoons on. The piece looked like a dry, hard sponge. On top I put a layer of old dry thick bark, off a gum tree. Then I put earth on top, and kept on adding fresh earth nearly every day, because it kept on sinking, and the ants kept on making channels and making the top hard. Then I put some green wattle wood in as they like wattle wood. By mistake a nasturtium seed got in and grew, and the ants keep eating it. White fluffy and thready stuff, which I think is fungus, is also growing, and I have seen the ants nibbling it.

The ants have now been in the bottle five months. There are hundreds more than I put in, so they must have been bred in the bottle. When you hold the bottle up and look at it from underneath, you can see swarms of the little ants hard at work. At first I could see the queen from underneath but now they have quite covered her in. When I first put them in moisture formed on the sides of the bottle inside so that I could not see very well. There is no sign whatever of moisture now. They keep sticking the mud on the sides of the bottle where the earth does not touch. Every now and then I open the bottle to let in fresh air. You cannot see any ants from the top, but you can see two stems of the nasturtium eaten off by the ants. You can see fungus growing at the sides of the bottle, but you can now only see the ants there by looking carefully along some of the channels. I have never given them any water. I cannot count how many ants there are. There must be hundreds of them now. I have not put in any fresh earth or wood now for quite two months, as the bottle is nearly full but they seem as lively as ever.—Yours, etc.,

HOWARD MULLENS.

Mountain Rise,
11th December, 1909.

Mr. J. Radford has been appointed to act as Stock Inspector for the Paulpietersburg Division, with effect from the 15th November, 1909.

THE FARMER BOYS' PAGES.

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Conducted by "ARATOR."

* * * *Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.o. Editor, "Natal Agricultural Journal," Maritzburg.*

Implements of the Farm.

V.—HARVESTING MACHINERY.

UNDER the head of Harvesting Machinery I shall consider, first, mowing machinery, and, secondly, reaping machines, since the reaper is a modification, or rather an extension of the mowing machine, and has been so perfected now as to be obtainable for the purpose, not merely of cutting corn, etc., but also of binding it in bundles.

The mowing machine comprises three essential parts, namely: (a) The cutting apparatus, (b) a frame holding the gearing which works the cutting apparatus, and (c) the wheels—two main wheels, attached to and supporting the frame and furnishing motive power to the cutting apparatus. A pole or shaft for the draught animals is fixed to the axle of the main wheels.

The cutting apparatus consists essentially of two long bars, placed one on top of the other, and the top one working backwards and forwards over the lower one. The lower one is a flat bar to which are attached a set of pointed objections; and the upper bar—the knife proper—is similarly constructed. The cutting apparatus projects from one side of the machine, and is constructed so as to allow of its being turned up and held in a vertical position for the purpose of travelling more easily along roadways and through gates. A guide is fixed to the end of this cutter bar which turns the grass over as it is cut and forms a swath.

A seat is mounted over and between the wheels and enables the operator to control the machine by means of a lever. In going over the next cut the wheels and horses pass on each side of this swath.

Reaping machines may be divided into three classes, namely: (a) Back-delivery reapers, leaving the cut crop at the back of the beam as is done by the mower; (b) Side-delivery reapers—which have a platform on which the cut crop falls, when it is raked off to the side of the machine by revolving rakes; (c) Self-binding reapers, which cut the crop and bind it into sheaves. We will consider each of these in turn.

Back-delivery reapers are much more simple in their mechanism than mowers. The simplest kind of reaper is one in which two men are seated on the machine—that is, one additional to the driver—the assistant sitting in front of the driver's seat and with a short rake collecting the standing corn into the knife, where it is cut. The corn as it is cut falls upon a platform where it remains until sufficient is cut and collected to form a sheaf, whereupon the platform is tilted and the corn falls to the ground. In this way the corn is deposited on the ground in bundles ready for binding by hand.

In another form of the back-delivery reaper, instead of its being necessary for a man to sit on the machine and rake in the corn, a revolving reel is used, driven by a suitable chain gearing from the axle of the machine. The mechanical rake usually has three blades that collect the corn on the platform and an arrangement for raking the sheaf off the platform on to the ground. Of course with this machine, as with the machine previously described, it is necessary to bind the sheaves by hand; and further to this the binding must take place before the machine can pass around the field a second time.

This latter objection led to the invention of the Side-delivery reaper. In this kind of reaper there is a platform attached to the rear portion of the cutter-bar, whilst on the machine itself a standard holds four or more revolving rakes. As these rakes revolve they gather in the standing corn on the knife and then rake it off the platform after it has been cut and throw it to one side behind the machine. This device results in a clear track being left for the horses on the following round.

If it is desired that the corn should be left in "sheaf"—that is, in bundles ready for binding by hand—what are termed "gatherers" are substituted for some of the rakes. These gatherers perform merely the first function of the rake, that is, they gather in the corn against the knife, but they are so constructed as to pass over the corn after it has been cut and not sweep it off the platform as the rakes do. This means that the raking operation takes place at longer intervals during which time the corn has an opportunity of accumulating to a desirable extent, after which it is swept off the platform by one of the rakes as it revolves and is left on the ground behind the machine in a bunch all ready for binding.

The next step in the evolution of the reaping machine was the invention of Self-binding reapers. There are a large number of different makes of this type of machine on the market, but, while there are naturally many differences as regards details, the main principles of the machine are the same. After having been cut the grain is carried on an endless carrier over the drive wheel and down an incline until it reaches a bar standing vertically across its path. "Against this bar the grain is packed until a bundle big enough for a sheaf is formed. Then the bar, which is arranged to give way under a certain pressure, moves, and in doing so puts into gear the 'binder,' a curved arm which comes up from below, and after passing the binding string around the bundle leaves its end in the grasp of the 'knotter.' Finally this clever device first ties and then cuts the twine band, leaving the sheaf free to be kicked off the machine by a pair of levers provided for that purpose."—(Pidgeon). At first the manufacturers of self-binding reapers made the mistake of using wire for tying up the bundles. As a result particles of wire would find their way into threshing machines and give trouble. Nowadays manilla string is generally used for tying purposes. Owing to the superior and more rapid manner in which it performs the work of harvesting, the Self-binding reaper is rapidly superseding every other form of reaping machine.

Machines are obtainable for harvesting various crops, but it will be sufficient if we consider mealie harvesters and potato diggers, as these two crops are among the most important crops of this country. In the potato digger the tubers are generally raised by a deep cutting blade or broadshare, while the potatoes are scattered by a rapidly revolving wheel with projecting arms, the result of which is that the tubers are thrown out on the ground ready to be gathered.

Readers specially interested in maize harvesting machinery should read the lengthy description that was published in the *Natal Agricultural Journal* for November of last year (page 1381). For the purpose of this article it will be sufficient to refer to the different forms of mealie harvesting machinery at present in the market. The maize harvesters pure and simple consist of two driving wheels, between which is mounted a frame for the driving mechanism and platform. Two rows are cut at the same time, and the ground is assembled on the platform until sufficient has been cut to form a shock, when the horse is stopped and the stalks are set up. The combined harvester and binder can also be obtained for maize. In this machine the principle is somewhat as follows:—The stalks in the row are gathered between the pair of dividers, when they are cut and carried to a platform where the binding apparatus ties them up into bundles. The bundles are thrown off from the side of the machine.

Such machinery is, of course, only for harvesting the stalks; but the machines can also be obtained for picking the cobs from the stalks before the latter are harvested. The present day maize picker resembles the

binder in the construction of the maize frame drive wheels and dividers. It passes along the row of maize, which is straddled by the dividers, and the stalks, after being righted by the points, chains, and other devices, pass between a pair of inclined, corrugated rollers that snap or strip off the ears. The rollers are so placed that the ears fall naturally into a trough that extends along beside them. In order to provide snapping rollers to remove the ears and force them to fall always to the same side, yet permit free entrance of the upright stalks at the receiving end without the necessity of auxiliary means to bend the stalks laterally, James E. Goodhue arranged the snapping rollers in slightly skewed relation, by which the upright stalk may be gradually forced to one side as the picking rolls pass along, and the ears are broke off and directed to one side. The cobs are carried back by a travelling conveyor and either delivered to a set of husking rolls, or else, without being husked, carried by an elevator and delivered into a wagon which is driven alongside the machine.

Agricultural Chemistry for Beginners.

CHAPTER IV.

By ARCHIBALD PEARCE.

NITRIC ACID AND THE NITRATES.—NITROGENOUS MANURES.

NITRIC acid is chiefly noticeable for its salts, the nitrates; for it is in the form of nitrates that plants obtain almost, if not quite, all of their nitrogen. It is a liquid compound of hydrogen, nitrogen, and oxygen, very corrosive and poisonous, formed by the combination of an oxide of nitrogen with water, and is manufactured from a nitrate. It is a very striking instance of the way in which chemical compounds differ from their constituent elements, that the harmless gases of the air, first combining together and then with water, should produce the deadly poisonous and destructive nitric acid. The nitrates are almost entirely the result of the action of a microbe in the soil which has the power of converting ammonia into the nitrate of any base that may be present, usually lime, and so fitting it for the use of plants. This conversion takes place most readily in hot climates such as India, where, owing to the large amount of decomposing animal and vegetable matter in the ground, there is always a quantity of ammonia, and consequently

of nitric acid, in process of formation: and this is so marked that nitrate of potash, or saltpetre, often occurs in considerable quantities in the soil, and is washed out and purified for sale. The chief conditions which favour the process of nitrification, as it is called, are warmth, air, moisture, and the presence of phosphates and of some base for the nitric acid to combine with. If we look into these conditions it will be plain that they are best fulfilled in a well-drained and well-tilled soil, for if the land is sodden and water-logged, and if it is packed hard and not well broken up, the air cannot get entrance. Moreover, it is probable that in the absence of air, not only do the nitrifying organisms fail to flourish, but another variety comes into action which actually undoes the useful work of the others, decomposing the nitrates and setting free nitrogen, which, as we know, is useless to most plants in its uncombined state. It is easy to see, therefore, how necessary it is, for good results, that the land should be kept well stirred and drained if the crops are to receive the nitrogenous nourishment that is so indispensable for their well-being.

The nitrates are all very soluble, and not strongly retained by soils, so that they are easily washed away by heavy rains for this reason, except where the rainfall is light, if used as a manure they are best applied as a top-dressing. This excessive solubility explains the difficulty there often is in keeping up the supply of nitrogen in arable soils without the application of nitrogenous manures, for there will be a gradual loss of nitrates due to soakage, which can only be partially replaced from natural sources. A small quantity of nitric acid is often formed in the air by the passage of lightning discharges through it, causing the oxygen and nitrogen to combine, and then form nitric acid with the water present. This then further unites with any ammonia that may be in the air, forming ammonium nitrate, which is brought down to the earth by the rain, and acts as a small supply of plant food.

NITRATE OF POTASH.

The two most important nitrates are nitrate of potash, also known as nitre or saltpetre, and nitrate of soda. The former has been manufactured on a considerable scale in the so-called nitre-beds. A pile is made of earth, wood-ashes, and any animal or vegetable refuse available, kept moist by watering with drainage of stables or cattle sheds, but covered to protect it from excessive wetting by rain. The mass is occasionally turned over to expose it to the air, and after a time large quantities of saltpetre are formed by the action of the nitrifying microbes, and this is collected and purified. A similar action goes on in a compost heap or an ordinary manure heap; when thoroughly rotten there is a considerable formation of saltpetre, which is one of the most valuable constituents of such manures.

NITRATE OF SODA.

Owing to its use in the manufacture of gunpowder, nitrate of potash has a somewhat artificial value, and its place as a manure is taken by nitrate of soda, which is found naturally existing in South America, whence it derives the name of Chili saltpetre. It is excessively soluble, and apt to absorb moisture if left in a damp place, and being in a state ready for assimilation by plants, it is perhaps the quickest acting of all manures. It may be applied to all crops which need nitrogenous manuring, but its effect is, as it were, to stimulate the appetite of the plant, and unless there is a supply of other forms of plant food available, the hungry plant is rather damaged than assisted. It should, therefore, only be used in conjunction with other fertilisers, at any rate with phosphates, and is best put on after the crop is up, as it is so easily washed beyond reach of the roots. In fact, the safest plan is to apply the amount to be used in two or three light dressings with an interval between, or, as we say, in fractional top-dressings. It must not be mixed with superphosphate or any manure having superphosphate for a basis, as there will be a loss of nitrogen through the action of the acid in these manures. As a general rule, a good sample should contain about 15 $\frac{1}{4}$ per cent. of nitrogen, the usual standard being 15.65 per cent., corresponding to a purity of 95 per cent.

NITROGENOUS MANURES.

The farmer has often to ask himself whether a given crop should receive a dressing of nitrogenous manure or not; all that can be done here is to indicate the principles that should guide his decision. In the first place he must consider his crop; secondly, his land; and thirdly, the kind of manure to use. As to the crop, all cereals require a good supply of nitrogen, root crops perhaps rather less, while leguminous plants, which will be spoken of farther on, can practically do without any artificial aid in this direction. Potatoes, which are gross feeders, should always receive a dressing. But some soils are better supplied with nitrogen naturally than others; rich vegetable soils and loams containing a good proportion of decaying vegetable matter can often supply sufficient for the needs of a crop, while sandy soils often need it badly. Furthermore, it is plain that as animal or vegetable substances have first to decay with the formation of ammonia, and this has to be changed into nitrates, while ammonium salts have but one conversion to undergo and nitrates none at all, nitrogenous manures do not all act with the same rapidity. Such manures as sewage, blood, etc., act only gradually, giving a slow supply of plant food for a considerable period; while, on the other hand, it is quite possible for the effect of a dressing of nitrate of soda to be visible a day or two after application. Of the purely chemical fertilisers, sulphate of ammonia and nitrate of soda, the former would be preferred

in a wet season, the latter in a dry one, for obvious reasons. There seems, on the whole, little difference between their actual manurial effect on the crop.

In this connection, the system of green manuring with leguminous plants may be noticed. The legumes are an order of plants of which beans, peas, the clovers, lucerne, and vetches may be taken as examples; and their roots form the home of a species of microbe which has the convenient power of absorbing nitrogen from the air and supplying it to the plant. If then a crop of one of these varieties be grown, it will contain a store of nitrogen which has cost the farmer nothing; and if the crop be ploughed under, it will enrich the soil to a far greater extent than if some other kind of plant had been used, and the usual loss of nitrogen will be made up in the cheapest manner. It sometimes happens that the soil is free from the germs of these bacteria; in this case the absorption of nitrogen does not take place, but it has been found possible to inoculate the soil, so to speak, with the proper germs, then the process goes on in full force.

QUESTIONS.

1. Show that chemical compounds often differ greatly from the elements that compose them.
2. Give instances where microbes are useful to the farmer.
3. Why do vegetable soils often not need nitrogenous manures?
4. Mention all the nitrogenous manures you know of.
5. How much nitrogen is there in a ton of ordinary nitrate of soda?
6. How much ammonia would that be equal to?
7. What is the cheapest way of getting nitrogen into the soil?
8. Why should you bury bean and pea stalks after the crop is gathered?
9. What is the difference between ordinary saltpetre and Chili saltpetre?

A Chat about the Soil.

V.—THE PHYSICS OF THE SOIL.—(*Continued*).

PROCEEDING with our study of the physics of the soil, we come now to discuss the parts which odour, ventilation, and moisture play.

Everyone knows the smell of freshly turned earth. This smell, however, is not the same with all kinds of soil, but varies. If the soil contains a considerable proportion of decaying vegetation, it will have a different smell from that given forth by ordinary earth. Other special causes influence the smell given forth by the soil, but apart from these the earth

has a distinctive odour of its own, due, apparently, to some chemical substance the precise nature of which has not yet been ascertained, but which belongs to the aromatic or benzine series.

Every farmer knows that the soil requires ventilation, and this is a fact which must be fully appreciated, since a lack of sufficient air in the soil results in infertility, or, at the best, stunted crops. To understand the reason of this, it must be realised that "oxygen is the grand supporter of combustion," and oxygen, as everyone knows, is one of the constituents of the atmosphere. Now there are various chemical changes and bacterial processes taking place in every normal soil, and these changes are dependent upon what is known as oxidation—which means union with oxygen. The rusting of iron, the tarnishing of lead, and the decaying of wood are all instances of oxidation, chemical changes which could not take place otherwise than in the presence of oxygen. Consequently, in order that the chemical and other changes which are necessary for the maintenance and promotion of the fertility of the soil may continue to take place, it is necessary that easy access for the air to the lower layers of the soil may be furnished. Such access is afforded by the loosening of the soil and particularly by the prevention of the surface from forming into a hard crust. Cultivation indeed is largely for the purpose of promoting the aeration of the soil; and the soil that is in good tilth is one that is well ventilated.

Cultivation, as has been said, is necessary to keep the soil in such a state as to admit of easy access by the air, but cultivation is not necessarily sufficient. Stagnant water is the great enemy of ventilation. It will be easily understood that a soil which can be described as well aerated is one which has its pores open; and that where there is stagnant water in the soil these pores become filled with water, are never free from water, and consequently air cannot enter them. The removal of superfluous moisture in the soil which is the object of draining (an operation which will be described in these pages later), has for one of its objects the admission of air into the soil. Draining lowers the water table, as it is called—that is, the level at which ordinarily the water in the soil stands—and this means that there is a larger cubic space of soil above the water table into which air can enter freely—provided of course that cultivation is adequately carried out.

The air in the soil is not quite the same as the ordinary air which we breathe, as it contains a much larger proportion of carbonic acid gas—from 3 to 15 per cent. or more. This larger proportion of carbon acid gas is due to the decaying organic matter in the soil which gives off this gas.

Soil ventilation is carried on largely, in a state of nature, by the action of worms eating their way through the soil and making burrows to the lower layers, as well as by roots which force their way far down into the soil and in decaying leave tiny passages in all directions: lucerne

and other deep-rooted crops exercise a very beneficial effect in this way, especially in clay soils.

It may occur to some to question why special cultivation is necessary to secure aeration for farm crops when natural plants such as grass, bushes, trees, etc., are able to do without such cultivation. The answer is two-fold. In the first place these natural plants have evolved in and become used to a partially ventilated soil; whilst again the fact that these natural plants are able to exist satisfactorily and often luxuriantly in a partially ventilated soil, does not alter the fact that the growth of plants can be materially improved by the supply of more air than that to which they have been accustomed, in just the same way that, whilst a crop will produce a fair yield without the addition of manure, it will produce larger yields according as more manure is applied to the soil. Furthermore, most of the crops which are now grown by man specially for his and his domestic animals' needs, have been artificially evolved by him by a course of special selection: and this means that such artificially evolved crops have to be subjected continually to the very best conditions of culture that can be provided for them if they are to continue to produce to the extent which is expected of them—in other words to an extent which will make their growth on a farm a paying proposition. In short, cultivated crops must have the soil stirred so that the roots may actually have air to breathe, because they have been artificially evolved by cultivation.

If a piece of soil becomes waterlogged permanently, the plants that have been growing on it, accustomed to have air to breathe, will actually die by drowning, and their place will be taken by plants of an aquatic moisture.

Moisture in the soil is the next branch of our subject. A soil that is perfectly dry, without a trace of moisture, is to be regarded as a barren soil. It may have all the elements present in sufficient quantity for the satisfactory growth of a plant, but its fertility can only be regarded as potential. In other words, whilst the necessary elements are present, they cannot be made use of by plants, and consequently, so long as moisture is withheld, the soil is barren. Whilst moisture is necessary, however, too much moisture is just as bad as none at all, for reasons that we have just seen. If there is too much water in the soil the latter will be cold, sufficient air for oxidation will not be able to enter, and the soil will become sour owing to the development of various acids such as humic, geic, ulmic, etc.

Moisture to a certain extent is necessary in the soil in order to dissolve the soluble elements contained in the soil and so render them available for use by the roots of the plant. Roots are only able to take up plant food in the form of a solution: they absorb water from the soil, and if that water contains the elements of plant food in solution, then the

plant itself will be deriving nourishment, but if the water does not contain such elements in a dissolved form (in other words if there is no appreciable proportion of soluble minerals in the soil) then the plant must suffer from innutrition. So that it is necessary, for the growth of the plant, that the soil should contain a certain amount of moisture.

Water is supplied to the soil in either of two ways: by the rainfall and by irrigation. Of the total amount of water that falls as rain, only a certain proportion actually sinks into the soil. There are no available data as regards the proportion which is absorbed in Natal, but as in the less rainy parts of the British Isles it is reckoned that only one third to one half sinks into the soil by percolation, it may safely be assumed that less than this proportion is absorbed by the soil in Natal, on an average owing to the hilly nature of the country, although, of course, it is possible that in some districts the quantity of water that actually soaks into the soil is greater than is the case in the British Isles.

How much water soaks into the soil depends upon the nature of the country as regards its physical features—that is to say, the more hilly the country the less rain per square mile that will soak into the soil. Further, the nature of the rainfall itself has to be taken into consideration. For instance, in the case of heavy torrential rains a smaller proportion naturally will sink into the soil than when the rain falls as a gentle shower or is precipitated as mist. Again the texture of the soil has a very important bearing on the subject, and the texture of course varies with different soils. If the soil is of the nature of a fine clay the water will pass through it only very slowly, whilst through gravel soil it will run quickly; from which facts we gather that the rate of percolation depends very considerably upon the size of the particles of the soil. It may be mentioned here that the reason why the puddling of the soil by the continual passage of live stock when the ground is wet results in the land being spoilt temporarily for crop purposes, is because the particles of the soil are run together in a very fine condition and the water cannot get through, which results in the air being kept out of the soil. Ploughing and cultivation when the ground is wet has the same adverse effect upon the soil.

We have spoken, in an earlier part of this article, of the “water table.” The water table is the level at which water stands in the soil; it is approximately the level at which water would stand in a well. The water that falls as rain and sinks into the soil collects in the lower levels, saturating them gradually until an outlet is found. The presence of such outlet serves to keep the water table down to a certain level, and this is the principle of land draining, a subject which we shall discuss on another occasion.

We have seen that a soil that is of close texture, such as clay, does not permit of the ready passage of water from the surface to the lower

levels of the soil. In the case of a soil of this kind, the application of lime will remedy matters on account of its curdling or flocculating effect; whilst the addition of organic matter also has a good effect, and at the same time the ground should be worked as much as possible.

In our next article we shall continue to discuss the soil and moisture, and our first consideration will be the question of capillarity.

Dairy Notes.

DAIRY cows require better shelter than beef animals.

Pure butter fat weighs a little less than seven and three-quarter pounds to the gallon.

Liquids expand when heated and contract when cooled. A gallon of milk or cream heated will be less than a gallon when cooled.

Milk weighs about eight and one-half pounds to the gallon, varying a little according to the per cent. of solids.

Cream will weigh about eight pounds to the gallon, varying according to the per cent. of butter fat. The richer the cream the less it weighs.

The Value of Trees.

THE City Forester of Chicago gives the following reasons why trees should be planted and properly cared for:—

Trees are beautiful in form and colour, inspiring a constant appreciation of Nature.

Trees have an educational influence upon citizens of all ages, especially children.

Trees encourage outdoor life.

Trees purify the air.

Trees cool the air in summer and radiate warmth in winter.

Trees improve climate and conserve soil and moisture.

Trees furnish resting places and shelter for birds.

Trees enhance the value of real estate.

Trees protect the pavement from the heat of the sun.

Trees counteract adverse conditions of city life.

Trees create sentiment, love of country, state, city and home.

Trees enhance the beauty of architecture.

Practically the only objection raised to trees is the temptation they present to the average tree butcher.

Points of a Good Sow.

THE body of a good sow is long, deep and comparatively narrow. It should be remembered that the digestive organs of the brood sow play, perhaps, the most important part in her career. They are called upon to do more work at certain times than the digestive organs of any other animal, and the success of her litters is largely determined by the amount of food which those organs can make ready for conversion into milk. Hence it is, that length and depth in the body are exceedingly important features in a sow for breeding purposes. The next thing to look for is a well-formed udder, free from badly developed patches or calloused parts. The phlegmatic, sleepy sow is to be avoided. Good mothers are generally somewhat nervous, like dairy cows. Milk secretion has been proved to be largely a nervous function, and the dull, somnolent cow is seldom a mother of a high order. A good backline is a useful point. Hollowed backs are not safe; they should at least be level, and, if slightly arched, so much the better.—*Journal of Agriculture*, Western Australia.

Poultry Notes.

THE turkey roosts should be broad, not round.

Grit is essential, whether for chickens or grown fowls.

Feed your fowls at regular hours and they will be ready and waiting for their meal.

Plenty of pure fresh water will aid materially in maintaining good health.

Keep the breeding stock active, and feed as much variety as possible. This will assure better fertility.

Cheese is a good substitute for meat foods. It is nutritious, and may be fed to advantage to fowls of any age.

Feather pulling is a vice that comes from confinement and illness. The surest remedy is to get rid of the first fowls caught at it.

If the chicks are running with a hen see that both hen and chicks are free from vermin. Let the mother have access to a good dust bath; this will help to keep all clean.

Young turkeys cannot survive dampness until they are at least eight weeks old, and not then unless they are strong, well developed, and free from lice.

Rice is a capital food to give chickens once or twice a week, but should not be given oftener. If your chicks have diarrhoea try some boiled rice sprinkled well with powdered chalk. This will frequently effect a cure.

Sheep Notes.

A SHEEP with its wool soaked with water will suffer as much on a chilly day as a man with a rain-soaked overcoat.

A small flock of sheep on a well-conducted farm cannot lose money for their owner.

Sheep that are being fattened ought to have a ration of oatmeal every other day. It prevents indigestion and is beneficial in every way.

If you notice a sheep stretching itself frequently and standing with its legs far apart it is a sure sign that it has had too much dry feed. A warm, dry bran mash, with two tablespoonfuls of raw linseed, will generally remedy the trouble.

A man who really loves sheep is the most enthusiastic breeder of them all. Although sheep are stupid animals, some men seem to take more kindly to them than any other animal on the farm.

Generous and judicious feeding and care mean satisfactory profits in sheep raising.

Sheep succumb quickly to disease, but are easy to keep healthy if given a little attention.

The type of sheep that combines a large body with a good fleece is the one for the small flock owner.

No animal on the farm is as faintly as the sheep when it comes to drinking water. It must be clean before the sheep will touch it.

Care must be taken to have the sheep that are to be wintered over kept in a good thrifty condition during autumn. A thrifty sheep is much easier wintered.

One of the easiest ways to stiffen up a horse is to compel him to stand on a plank floor when not at work.

The lazy, good-natured hen does not make as good a mother as a cranky fighter, provided the latter is not so nervous as to keep running about all the time.

The cooling of milk should be done within one hour, and, if possible, immediately after being drawn from the cow. Making all due allowance for the action of the bacterial substance in milk, this is the safest procedure. This quick and continued cooling is absolutely essential in milk destined for the towns.

Meteorological Returns.

Meteorological Observations taken at Govt. Stations for Month of November, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.).				RAINFALL (IN INCHES).					
	Means for Month.		Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain in 1 day.		Total for Year from July 1st, 1909.	Total for same period from July 1st, 1908.
	Maximum.	Minimum.					Fair.	Day.		
Observatory ..	77.5	62.3	89	54	4.19	19	.91	10th	14.43	16.17
Stanger ..	80.9	62.1	101	55	6.11	16	1.12	5th	17.73	15.88
Verulam ..	85.9	66.3	99	52	5.14	13	.93	11th	12.90	16.60
Greytown ..	79.7	50.5	99	40	4.72	13	.97	28th	11.00	15.11
Newcastle ..	85.4	43.5	97	33	2.49	6	.97	30th	7.45	—
Lidgerton ..	79.7	48.9	99	40	4.12	19	.67	14th	10.07	13.47
Estcourt ..	85.5	53.2	102	44	3.50	12	.63	2nd	5.82	11.10
Mid-Delva ..	76.5	54.8	101	45	4.10	21	.60	15th	13.88	17.53
Isipingo ..	—	—	—	—	2.74	12	.47	18th	9.72	15.76
Imbuzana ..	76.8	58.8	89	49	5.75	15	1.26	30th	14.97	17.52
Port Shepstone ..	81.4	55.2	88	49	6.25	10	1.10	2nd	17.25	20.93
Cumtoto ..	85.2	58.1	94	55	4.20	7	1.45	29th	15.68	18.77
Richmond ..	16.4	53.4	101	44	4.51	15	.79	17th	15.44	18.91
Maritzburg ..	79.8	55.4	103	47	2.71	14	.75	14th	9.27	12.68
Howick ..	77.9	53.0	98	45	4.12	16	.62	15 h	9.79	13.98
Ludysmith ..	89.3	57.1	101	44	1.59	10	.60	28th	5.57	—
Dundee ..	83.2	56.5	96	48	2.49	9	.67	29th	8.43	12.50
Weenen Gaol ..	91.3	56.5	106	49	3.02	13	.62	17th	6.02	12.82
Camdenburg ..	77.4	54.8	101	46	2.29	10	.40	17th	8.87	10.52
Krantzkloof ..	72.9	57.9	92	49	5.27	17	1.30	16th	15.55	16.56
New Hanover ..	84.1	55.0	103	43	3.53	14	1.12	17th	9.64	16.50
Krantzkop ..	79.3	43.0	97	35	8.22	19	1.84	17th	12.91	11.83
Nqutu ..	77.4	49.1	89	40	4.40	10	1.35	28th	—	12.88
Nongoma ..	75.0	55.3	97	40	3.65	13	.81	18th	9.40	—
Utrecht ..	92.4	43.5	99	33	1.65	5	.60	29th	4.92	—
V. yhele ..	77.2	55.0	94	41	3.64	12	1.15	29th	8.84	16.99
Mahabeni ..	82.1	47.1	95	40	6.08	14	2.17	1st	12.22	11.98
Hlabisa ..	85.5	62.0	95	53	6.57	11	2.75	18th	16.69	15.21
Me. moth ..	—	56.2	106	41	3.16	14	.65	29th	8.70	11.79
Ubono ..	73.3	58.2	88	49	7.49	12	3.71	2nd	15.93	14.85
Mtunzini ..	83.4	53.0	109	49	10.00	14	2.16	17 h	32.83	24.43
Point ..	—	—	—	—	3.52	17	.43	28th	16.33	18.73
Umbogintwin ..	79.4	60.3	87	49	4.50	21	.80	16th	16.59	—
Nottingham Rd ..	76.4	45.8	97	35	2.57	8	.96	29th	5.87	—
Char estown ..	75.2	50.9	86	36	4.21	11	1.17	12th	8.67	13.57
'Ngom Forest ..	71.7	51.9	96	40	7.94	24	1.77	29th	20.00	—
Empangeni ..	83.6	61.6	102	50	4.88	15	1.45	17th	18.66	17.82
Bulwer ..	—	—	—	—	5.60	22	.78	17th	11.60	19.08

Meteorological Observations taken at Private Stations for Month of November, 1909.

STATIONS.	TEMPERATURE (IN FAHR. DEGS.).		RAINFALL (IN INCHES).					
	Maximum for Month.	Minimum for Month.	Total for Month.	No. of Days.	Heaviest rain in 1 day.		Total for Year from 1st July, 1909.	Total for same period from July 1st, 1908.
					Fall.	Day.		
Adamshurst ..	106	45	3.4	12	.58	17th	—	11.55
Hilton ..	6	43	5.44	22	1.11	15th	11.87	13.84
P.M.B., Botanical Gardens ..	101	45	3.63	17	0.89	14th	10.56	13.32
Ottawa ..	—	—	3.81	15	0.65	16th	13.86	16.58
Mount Edgecombe ..	—	—	3.92	12	0.67	15th	15.63	18.21
Equeefa ..	92	52	3.29	13	0.57	10th	13.17	18.74
Umzinto, Beneva ..	—	—	5.59	12	1.51	30th	14.39	17.37
Umlungeni ..	91	—	6.93	14	1.86	29th	17.18	—
Riet Vlei ..	—	—	2.99	15	0.75	28th	5.88	—
Cedara—Hill Station ..	100	44	3.05	30	0.59	30th	6.87	—
Vlei Station ..	101	42	3.05	21	0.63	19th	—	—
Winkel Spruit ..	88	51	4.64	14	0.75	14th	15.80	18.05
Weenen ..	102	40	2.53	11	0.70	1st	5.59	—
Grant's Castle ..	72.2	47.1	3.0	13	0.48	15th	8.36	12.98
Eshowe ..	—	—	6.66	11	1.80	29th	—	—

Coal and Labour Return.

Return of Coal raised and Labour employed at the Natal Collieries for the month of November, 1909:—

COLLIERY.	Average Labour Employed.					Output. Tons. Cwt.
	Productive Work.			Unproductive Work.*	Total.	
	Above Ground.	Below Ground.	Total.			
Natal Navigation ..	374	663	1,037	10	1,047	28,617 0
Durban Navigation ..	249	664	913	—	913	19,716 0
Elandslaagte ..	290	608	898	12	910	18,425 10
St. George's ..	229	478	707	7	714	16,033 0
South African ..	147	313	460	59	519	14,188 3
Dundee Coal Co. ..	241	423	664	—	664	14,011 2
Natal Cambrian ..	215	383	598	3	601	10,842 16
Glencoe (Natal) ..	172	331	503	45	548	10,208 5
Takana ..	112	391	503	17	520	8,235 19
Newcastle ..	77	350	427	—	427	7,185 15
Hatting Spruit ..	82	153	235	5	240	6,443 5
Hlobane ..	106	262	368	19	387	6,408 6
Natal Steam Coal Co. ..	92	210	302	—	302	5,818 2
Ramsay ..	94	140	234	—	234	4,329 18
West Lennoxton ..	55	88	143	—	143	1,775 18
Ballengeigh ..	68	104	172	7	179	1,492 8
†Mooklip ..	—	16	16	—	16	84 10
Dewar's Anthracite ..	5	7	12	—	12	85 0
†Vryheid ..	11	15	26	—	26	59 0
§Vaalbank ..	—	8	8	8	16	20 0
Makutees Kop ..	3	—	3	—	3	5 0
Totals ..	2,622	5,607	8,229	192	8,421	173,950 17
Corresponding month, '08	2,383	5,075	7,458	803	8,261	141,243 15

	Productive Work.			Unproductive Work.	Total, Nov., 1909.	Total, Nov., 1908.
	Above Ground.	Below Ground.	Total.			
Europeans ..	206	163	369	41	410	390
Natives ..	934	3,518	4,452	102	4,554	4,581
Indians ..	1,482	1,926	3,408	49	3,457	3,280

* Cost Charged to Capital Account. † October Return. § Includes October return.
‡ Includes September and October returns.

CHAS. J. GRAY,

Mines Department, Maritzburg, 8th December, 1909.

Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal bunkered and exported from the Port of Durban for the month of November, 1909:—

				Tons. Cwt.
Bunker Coal ..	..	..	..	94,213 17
Coal Exported ..	..	..	..	28,014 8
Total ..				122,228 5

Customs House, Port Natal,
1st December, 1909.GEO MAYSTON,
Collector of Customs.

Return of Farms at Present under Licence for Lung-sickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Crow ..	Ladysmith ..	Scab	Natives ..	Goedgedacht
			Natives ..	Roopoort
			J. Kumalo ..	Driefontein
A. B. Koe ..	Portion of Estcourt		H. Illing ..	Krantzkloof
			R. Mattison ..	Cale At
A. C. Williams ..	Utrecht ..		J. F. Hopkins ..	Highfield
			D. Hartman ..	Ro-ekop
			J. de Winnaar ..	"
			C. Potgieter ..	Nikomat
			P. Truter ..	Welgevonden
			— Lekhoff ..	Ba-e Spruit
			Y. Hambridge ..	Strydfontein
			Natives ..	Rodekoppen
			G. J. Keel ..	Ventersplaats
			T. Uys ..	Zoetsmeek Meer
			S. Grobler ..	Kimpey
			P. L. Uys ..	Waalhoek
L. Trenor ..	Alfred ..		Yalwavo ..	Location
		Lung-sickness	J. T. Clothier ..	Whitecliff
		Scab	Natives ..	Location No. 1
J. R. Life ..	Lion's River ..		W. G. Shaw ..	Colb urne
R. Wingfield Stratford	Newcastle ..		M. P. de Jager ..	Muller's Pass
			A. J. Johnstone ..	Battlefield
			Natives ..	Highvale
G. Daniell ..	Vryheid ..		G. Dimock ..	Alicedale
			A. Armstrong ..	Lekkerwater
			G. van der Wenter ..	Tintastift
			J. A. K. van Rooyen ..	Rust-hats
			L. J. de Jager ..	Scheulhoek
			N. M. Gunter ..	Kromellenburg
J. R. Cooper ..	Nkandhla & Nqutu		Natives ..	Rodepoort
			Natives ..	Telezi
			" ..	Dalala
			" ..	Haladu
			Westbrook Bros. ..	Danton
E. Varty ..	Western Umvoti ..		J. A. de Waal ..	Mazenkomo
			D. C. S. Nel ..	Highfield
			J. A. Graham ..	Driefontein
			H. Hamsmeier ..	Oornst
			T. J. Nel ..	Mt. Ernestina
R. Mayne ..	Eastern Umvoti & Krantzkop		S. C. van Rooyen ..	Driefontein
			I. M. J. van Rooyen ..	Scotsdale
			S. C. van Rooyen ..	Oversioed
E. W. Bowles ..	Ixopo ..		D. Havemann ..	Umvoti Poort
			Natives ..	Batmand
			" ..	Location No. 8
			" ..	Lot BB
			" ..	Lot A of 8
			F. Herbert ..	Normandale
			L. Howes ..	Morington
A. H. Ball ..	Weenen.. ..		J. P. Lotter ..	Berg Vleib
			P. H. van Rooyen ..	Buffels Hoek
			P. P. van Rooyen ..	Duomkloof
			Naude & Lotter ..	Scottshoek
			J. T. van Rooyen ..	Belle Vne
A. F. Smith (acting)	City, Umgeni ..		Natives ..	Belle Vne
			Laduma ..	Zwaartkop Location
A. J. Marshall ..	Dundee ..		Ramen ..	Ellis' Estate
			Natives ..	Klipport
			" ..	Blinkwater
			" ..	Hartebeestfontein
			G. F. Damhauser ..	Cardwell
			T. C. Koekmoor ..	Maybole
			N. B. Swarts ..	Roelkop
			H. P. Walker ..	Town Lands
			C. J. Pieters ..	Zwaartkop
			Mrs S. J. Kemp ..	Kelvin
			S. B. Jones ..	Carnarvon
			Natives ..	Banff
			Hesom Bros. ..	"
B. Klusener ..	Lower Umzimkulu	Lung-sickness	Nyapu ..	Berbeck
J. Stewart ..	Bergville ..	Scab	A S G & Mrs Beukes ..	Middledale
C. E. Walker ..	Portion of Estcourt		S. B. Woollatt ..	Stangers Hoek
J. F. van Rensburg	Ngotshe ..		A. M. Potgieter ..	Tochevonde
			H. B. J. Bester ..	Town Lands

Pound Notices.

NOTIFICATION is contained in the *Government Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified:—

ON THE 5TH JANUARY.

Good Hope (Klip River Division)—Shearling wether sheep, branded with red paint J. 1. very indistinctly.

Ngutu—Twenty two kafir sheep, mixed colours, pieces out of both ears, no brands.

Vryheid—(1) Dark bay mare, long mane and tail. (2) Dark bay mare, long mane and tail, branded C. 2. (These two animals are running on the farm "Sweetwaters," and were reported by Mr. Armstrong as too wild to be driven to the Pound.) (3) Dark bay gelding, 14 hands, long mane and tail, off hind feet and fetlock white, half circle out of right ear, no brands; about 4 years old.

Woodstock (Bergville Division)—(1) Sheep, about one year old, swallow tail in right ear, and two cuts in same. (2) Black goat, no marks. (These two animals are running on the farm of Tentwa, Bergville Division, and were reported by F. E. Gissing to be too young to be driven to the pound.) (3) Merino sheep, branded O on right flank. (4) Merino sheep, brand indistinct, but looks like O. (These two animals are running on the farm "The Lake," Olivier's Hoek, and were reported by P. Van de Reit as too wild to be driven to the Pound.)

ON THE 12TH JANUARY.

Mooi River—Bay entire, slightly flea-bitten on hind quarters, both hind heels white, star, no brands or marks visible, about 14 hands. Probable value, £10. (This animal is running on the farm "Glen Annie," and was reported to be too wild to be driven to the Pound.)

ON THE 19TH JANUARY.

Donnybrook—Dark bay gelding, aged, 13.2 to 13.3 height, black points, no brands. *Hope Farm (Newcastle Division)*—Brown mare, about 3 years old, branded, looks like I.P. (This animal is running on the farm "Donker," and was reported to be too wild to be driven to the Pound.)

Mooi River—Blue grey filly, 2 years' old, no brands or marks. (This animal is running on the farm "Strathearn," and was reported to be too wild to be driven to the Pound.)

Thornville Junction—Light grey donkey, gelding, branded, looks like 6, on near side neck, slit in tip off ear.

Umsinga—(1) Fourteen assorted Kafir sheep. (2) Two white sheep, branded C.P. on back. (3) Black she goat and young one. (4) Yellow she goat. (5) Red he goat.

Victoria (Klip River Division)—Two pigs, boar and sow, black and white, about six months old.

ON THE 2ND FEBRUARY.

Acton Homes—(1) Four she goats, right ear tipped, no brand. (2) Three kids. (3) Ewe, branded I in circle on right side, and its lamb.

Ginginhloru—White mare mule, three indistinct brands on near hind leg, near hind leg badly deformed.

Good Hope (Klip River Division)—Nine mixed Kafir goats. Impounded by Natal Police.

Ingogo—Bay gelding, height about 14.1, off hind pastern white, saddle mark, found straying, and impounded by Natal Police, Spitzkop.

Nkandhla—Strawberry Roan Mare, white off hind fetlock, 13 hands.

Ngutu—Dark bay gelding, flea-bitten, about 14.1, thick set, near hind foot white, reim mark above near knee, medium mane, switch tail, no brands.

Vryheid—Four merino ewes, no visible brands, nicked V on left ears, about 18 months old, heavy wool, suffering from scab. (Running on Town Hill with an infected flock, and cannot be removed to the Pound.)

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
Commissioner of Mines.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible :—

Admittance of Students to the School of Agriculture.—House Master, Cedara.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.

Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.

Agricultural Seeds, etc., for Irrigation Farming.—Curator, Govt Station, Weenen.

Fruit.—Orchardist, Cedara.

Accounting Business.—Accounting Clerk, Cedara.

Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.

Apiculture—Apiarist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry, Cedara.

Farm Apprentices' Bureau.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | |
|--------|---------|---|
| No. 2. | Age 15. | Has had 18 months' experience of farming. Understands more about forestry than general farming. Speaks Zulu, and understands Dutch. |
| „ 3. | Age 24. | Colonial born. Has a knowledge of bookkeeping. |
| „ 13. | Age 20. | Is an orphan. Is anxious to learn farming. |
| „ 15. | Age 19. | Is desirous of learning farming. |
| „ 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. |
| „ 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. |
| „ 30. | Age 15. | Transvaal born. Has had experience on a mixed farm. Speaks Dutch and Zulu. |
| „ 34. | Age 18. | Has a slight knowledge of Zulu. Understands carpentry. |
| „ 35. | Age 21. | Has had five years' experience on farms. Understands cattle and horses and Agriculture. Is anxious to get back on a farm. |
| „ 39. | Age 19. | Has had twelve months' experience on a fruit farm in the Cape Colony. Speaks Dutch. |
| „ 40. | Age 24. | Has had a little experience of farm life. Understands bee-keeping. Is anxious to get on a farm. |
| „ 46. | Age 21. | Served a term of apprenticeship to a firm of agricultural implement makers. Industrious and level-headed lad. Very good references. |
| „ 47. | Age 21. | Is anxious to obtain a situation on a farm. Has been in ironmongery trade for 2½ years. |
| „ 48. | Age 18. | Has had 4½ years' experience in agricultural and stock farming in the Dundee and Ixopo Divisions. Has had a good deal of experience with cattle, but not much with sheep. Has also had experience with poultry and a little with bees. Is a good Zulu linguist. |

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 115.—Englishman, 26 years of age, steady and an abstainer, with a knowledge of cattle and horses, wishes employment on a farm in Natal (English preferred) as a handy man, with a view to furthering his knowledge of farming in this country. Is willing to accept food and clothing in a good home, for services, for a few months with the prospect of a small wage after the first three months.

No. 116.—Cape man, age 32 years; married, no children. Has been used to working with horses and mules all his life. Has good papers from his previous employers, and was in the employ of the Public Works Department for over five years. Is willing to do anything in his power, but cannot read nor write.

No. 117.—Englishman, 25, of good education, desires appointment as overseer on a plantation in Natal, and would pay a reasonable premium and give services free for a few months if necessary. Has had commercial, engineering, surveying and mining experience.

No. 118.—Pensioner from the Army desires to obtain post on a farm. Is particularly fond of gardening. Has excellent discharge papers and good testimonials.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 121.—Desires open air employment. Age 43. Life experience of agricultural pedigree and prize stock gained in Scotland. Has been six years in South Africa. First-class references and testimonials. Small salary required.

No. 122.—A young man, with life-long experience of cane-growing, desires employment as manager or overseer on a plantation. Experience has been in Queensland and Fiji. Is good at figures and capable of taking charge of books if necessary.

No. 123.—Married man, 35 years of age, with 5 years' experience on poultry and stock farm in California, wishes to get on to a farm in Natal. His wife is a good cook and handy in dairy. Would be willing to work for a very small wage or for their keep or a period of twelve months at least, after which they would expect some remuneration. Can produce first class personal references.

No. 124.—Practical man, age 35, unmarried, seeks position on any work. Can undertake or attend to any building work and erection of machinery, and has been accustomed to control of coloured labour. Could undertake management of small creamery. Not afraid of work. Has had considerable experience in Agriculture, and can produce highest references.

No. 125.—Single man, age 31 years. Was brought up on a farm in England. Is a tinsmith and plumber by trade, also has a good knowledge of carpentry. Speaks Dutch. Has been in South Africa for ten years.

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127.—An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement up to February, 1910. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 128.—Wishes to secure employment on a farm. States that he has a general knowledge of engineering, and has been employed on a large and well-known farm in the Richmond Division.

No. 129.—Wishes to secure employment on a farm. Experience in gardening and agricultural work generally, but more especially the former.

No. 130.—Age 22. Understands farming and is a good Zulu linguist. Desires situation on a farm, more especially as manager.

Government Cold Stores and Abattoirs.

PIETERMARITZBURG.

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

	Calves up to One Year old.	Cattle over One Year old.	For minimum number of 250 head per month.		For maximum number of 500 head per month.	
			Under 300 lbs. weight.	Over 300 lbs. weight.	Under 300 lbs. weight.	Over 300 lbs. weight.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1. Receiving per head	0 3	0 6	0 6	0 6	0 3	0 3
2. Killing and Cleaning	2 3	3 6	2 9	3 3	2 6	3 0
3. Labour	0 3	0 6	0 3	0 6	0 3	0 6
4. Disinfectants	0 1	0 1	0 1	0 1	0 1	0 1
5. Bagging (4 Quarters) per body	1 9	3 0	2 6	2 9	2 3	2 6
6. Cleaning of Tripes each	0 6	0 6	0 6	0 6	0 6	0 6
7. Chilling of Beef, up to 72 hours or portion thereof per body	1 0	2 9	2 0	2 6	1 9	2 6
8. Chilling of Offal, up to 72 hours or portion thereof per set	1 0	1 0	1 0	1 0	1 0	1 0
Chilling and Freezing Beef—						
9. 1st week or portion thereof per body	2 0	4 6	3 9	4 0	3 6	3 9
10. 2nd " " " " " " " " " "	1 0	4 0	3 3	3 6	3 3	3 3
11. 3rd and remaining weeks or portions thereof " "	0 8	3 0	3 0	3 0	3 0	3 0
Chilling and Freezing Offal—						
12. 1st week or portion thereof per set	1 4	1 6	1 4	1 4	1 4	1 4
13. 2nd " " " " " " " " " "	1 0	1 3	1 0	1 0	1 0	1 0
14. 3rd and remaining weeks or portions thereof " "	0 9	1 0	0 9	0 9	0 9	0 9

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg, 21st December, 1908.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

NATAL GOVERNMENT RAILWAYS.

FAMILY EXCURSION TICKETS.

WITH effect from the 1st January, 1910, First and Second Class Family Excursion Tickets, restricted to husbands, wives and their children residing with and dependent upon them, will be issued in Through Traffic all the year round between Natal Government and Central South African Railway Stations (distant not less than 60 miles apart), at SINGLE FARE PLUS ONE-TENTH, valid for four months from the date of issue.

One *bona fide* servant may be included upon the necessary declaration having been signed by the head of the family.

These tickets are subject to a minimum of two adult fares exclusive of servant.

Printed forms, with the regulations and conditions endorsed thereon, may be obtained on application at any railway station.

HEDLEY SALMON,

Maritzburg, December 16th, 1909.

Acting General Manager.

SOUTH AFRICAN STUD BOOK.

A record of all classes of Stock: the object being to encourage the breeding of thoroughbred stock and to maintain the purity of breeds, thus enhancing their value to the individual owner, and to the country generally.

Application for Membership and Entries of Stock should be addressed:—

For CAPE COLONY	A. A. PERSSE, P.O. Box 703, Cape Town.
„ TRANSVAAL	F. T. NICHOLSON, P.O. Box 134, Pretoria.
„ ORANGE RIVER COLONY ..	E. J. MACMILLAN, Government Buildings, Bloemfontein.

THE SOUTH AFRICAN STUD BOOK

IS OBTAINABLE OF:—

T. MASKEW MILLER,
ADDERLEY STREET, CAPETOWN.

PRICE 10s. 6d.

A. A. PERSSE,
SECRETARY, SOUTH AFRICAN STUD BOOK ASSOCIATION.

Indian Agricultural Research Institute (Pusa)

LIBRARY, NEW DELHI-110012

This book can be issued on or before

Return Date	Return Date

